

Radio Control **CAR ACTION**

THE WORLD'S LEADING R/C MAGAZINE

TOP 10 READERS' PICKS

May 1996

THE HOTTEST NEW CARS!

HPI
RS4
pg.52

AM ASSOCIATED
RC10B2

RC10B2

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7-page
race
review

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- Rebuild shock seals
 - Repair bent hubs
- Swap shock pistons
- Set ride height

ALSO TESTED

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ru-Lathe

EKIN
RC110L Charger

UNDER TIGER
Challenger Pro Buggy

In the Pits
With
Kinwald

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THIS PAGE: R/C oval racing on a bicycle
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EDITORIAL

You've Picked The Top 10

We receive thousands of letters each month, and by far the most frequently asked questions are of the "Which is best?" variety. Wow! Talk about putting us on the spot! Given all that's available, how do you pick one car, one truck, or one motor over another? Which is the best? That depends on what's important to you. This year, we decided to deviate from our traditional "Top 10" format and relinquish command to you so that *you* can tell *us* what's hot.

Here's what we did. In the February 1996 issue, we published a readers' ballot in which we asked for answers to 10 questions: which is your favorite car, truck, driver, track, charger, motor, radio, speed control, *Car Action* article, and which race would you most like to attend? We expected that the response would be large enough to allow statistical analysis, but you surprised us with an overwhelming flood of ballots. Thank-you to all who voted!

We also expected to be surprised by your choices, but guess what? Aside from a few minor exceptions, your picks closely match what we would have picked—amazing! Want to see what your fellow readers like? Turn to the full feature for all the details.

THE HOTTEST NEW CARS ARE HERE

This is an exciting time to be involved with the R/C car hobby. Technology is on the fast track, and hobby-shop shelves are overflowing with new kit releases. In this issue, we feature two of the year's most eagerly awaited new car kits.

First, Team Associated's RC10B2—the buggy that made its debut by winning the IFMAR World Championships. Seven years in the making, this replacement for the venerable RC10 is a radical departure for Associated, and it's the subject of much discussion and debate among off-road racers worldwide. I tested the B2 for several weeks under rigorous racing conditions, so if you want to find out how the "stealth" car fared, check out my Thrash Test.

Also in this issue—our review of the HPI RS4 touring-car chassis. We gave you a glimpse of this car in November 1995's "Inside Scoop," and since then, you've been clamoring for more. HPI has finally released the RS4 kit, and it's even more impressive than we had expected; the touring-car class is definitely becoming more high tech. Look for John Howell's review of the RS4 to find out whether you should jump on the bandwagon.

START THE SEASON WITH A BANG!

The weather is getting warmer, and once again, R/C'ers are beginning to flock to the great outdoors. Get a jump on the R/C season by checking out all the new products in this issue. And don't forget all the "how to" information we've included; this month, we show you how to select a motor and power supply and rebuild your shock seals the *right* way. This, plus our usual selection of columns and features makes this one heckuva kickoff to the summer R/C season. Enjoy!



Frank Masi, Executive Editor

We want to hear from you!

Write, fax, or e-mail us on the Internet:

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Radio Control CAR ACTION

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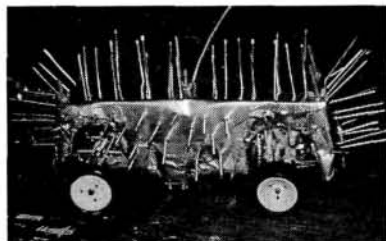


Spiny Norman Revealed

I was thrilled to see the "Robot Wars" article in the March issue of the greatest R/C magazine. I saw a sneak peek of the article in "Inside Scoop," and I had been eagerly awaiting the full coverage.

I'm writing because I think I found a mistake in the article. The caption for the picture of "Spiny

Norman" (page 69) said that it was based on a Tamiya truck chassis. I saw a feature on the Discovery channel about the Robot Wars,



and they showed a close-up of Spiny Norman without its shell. I believe that the chassis is really an Associated RC10. Every magazine is entitled to make mistakes, but I thought I'd point this one out.

Vandamme4@aol.com

Well, as you pointed out, every magazine is entitled to make mistakes and, in this case, you're right: we made one. Spiny Norman is based on an Associated RC10 chassis. Thanks for letting us know.

Stacey

Quad Racing

I'm building an electric 1/8-scale racing quad similar to the full-size Honda FourTrax 250R. I've tried to find a company that makes suitable scaled-down parts, but I have come up short so far. Do you know of any sources of

chains and sprockets that would fit the shaft on an electric motor such as the Green Machine? I've seen them on some of the drag-racing cars and on the Kyosho 1/8-scale motorcycles (NSR 500 and YZR 500). Is there a company out there that will mold plastic parts, such as fenders and side panels, for me when I have the correct dimensions figured out? How about machined parts, such as a swing arm, front A-arms and the basic frame? Any information would be greatly appreciated.

JAMES THOMAS

Montezuma, IA

Well, James, look back at the July 1995 issue. In it, you'll find Kevin Holmlund's article on how he made his '89 FourTrax 250R replica. It's absolutely one of the best-looking and most true-to-scale homebuilts I've ever seen. Kevin kindly says you can contact him for information if you want to. His address: Kevin Holmlund, c/o Dataflow Co., 1487 Chain Bridge Rd., Ste. 304, McClean, VA, 22101. Good luck with your own homebuilt Honda.

Doogie

MRC Queries

Is the MRC MT-10M available as an RTR? Would Pro-Line Road Hawks tires fit it? What's the fastest motor

I could throw in that would allow me to stay in control? At the nearby pan-car oval track, some racers solder their batteries packs in. Is this also needed in other R/C cars and trucks? Which battery pack would give the MT-10M the longest run time? Which inexpensive battery charger would charge it the fastest? Thanks for the info. You have a great magazine.

TOM GORMAN

Malvern, PA

Tom, the MRC MT-10M is available in RTR form (part no. MRCC201). Pro-Line Road Hawks will fit its wheels perfectly. Don't buy a motor with fewer than 15 turns, or your run time will be very short. Also, if you do buy a modified motor, buy a 17-tooth, 48-pitch pinion gear as well, because with the stock 20-tooth pinion gear, your truck will be overgeared. You don't have to hard-wire your battery packs, but many drivers—especially on-rollers—do it to gain that competitive edge. Most professional off-road drivers use high-performance plugs, such as Deans Ultra Plugs and Litespeed Super-Con connectors, without any performance loss. Batteries with a greater capacity, such as 1700mAh and 1800mAh, give the MT-10M the longest run times. As for your charger question,

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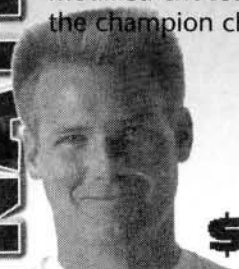
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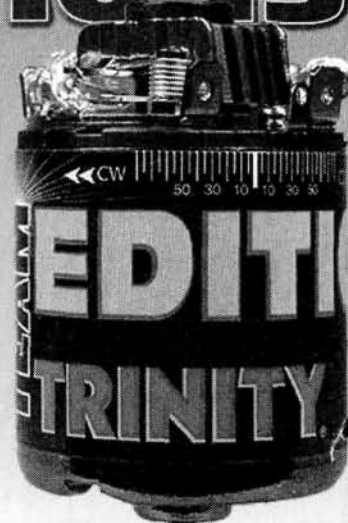
NATIONAL

When it comes to winning ROAR National Championships no one does it better than "The Magic Man." Joel knows what it takes to win... and that's horsepower, and lots of it! That's why Joel chose a Team Edition '96 Epoxy Balanced modified motor to power his Revolver 22j to his 22nd National Title. For your next modified choose the same power the champion chooses!



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LETTERS

I can't answer that one because there are too many variables.

George

Quest for the Cosmo

I've been a subscriber for about 5 years, and the issues get better every month. Years ago, when I was starting in the hobby, you tested the Kyosho Cosmo. I fell in love with it and went seeking one. None of my local hobby shops carried it, so I ended up with a Team Associated RC10, which has served me well. I still want the Cosmo, and I still can't find one. Do you know if any hobby shops or mail-order companies stock it? In my area, I've tried Sheldon's Hobbies and D&J Hobby, and I tried Tower Hobbies, too.

RUSSELL CLARK
2651 Sutro Dr.
San Jose, CA 95124

Well, Russell, we're not too sure whether anyone still stocks the Cosmo. You have already tried

Sheldon's, D&J and Tower, so the next most likely place would be your local "bargain news"-type paper. People are always selling used R/C cars. You could also check out *R/C Car Action's* Classifieds; you can place an ad there by calling (203) 834-2339. If anyone can help Russell with his search for a Kyosho Cosmo, please contact him at the above address. Good luck!

Stacey

Where's Wood?

I read your coverage of the U.S. Oval Masters in the August 1995 issue, and I am interested in the Wood Racing X-13 chassis shown in the "New in the Pits" section. Do you have a phone number or address for Wood Racing?

CONNOR ANDERSON
Brewster, NY

Wood Racing moved recently. They're now at 37601 Dartmouth Dr., Sterling Heights, MI 48310; (810) 268-5005; fax (810) 939-6227.

Stacey

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

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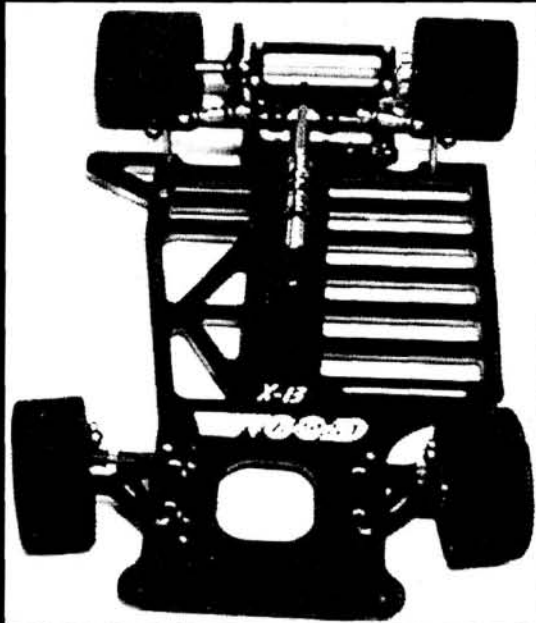
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Check out the articles on the Indoor Champs and the Winterfest in this issue!

Wood Racing

Mike Blackstock TQ's & wins '96 Winter Champs never losing a race all weekend!

1995 U.S. Oval Masters Champion



X-13 1/10 Oval Car

The only car to turn 20 laps at Indy & CA. Velodromes!

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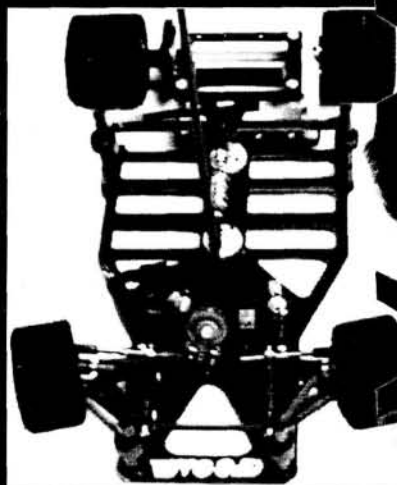
Features: fully adjustable weight distribution (front to rear & left to right), front track can be offset or centered, adjustable wheelbase, and the revolutionary C.S. (Controlled Susp.) rear suspension. This past year when the X-13 was released, it quickly made a name for itself winning races like the Oval Masters, Cam World 600, The Majors, and the Winterfest.

Other Hot Products Include:

Hurricane 1/10 On Road Car
X-12 1/12 Oval Version of X-13
Controlled Suspension (C.S.) Kits
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In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



SANDMASTER FLASH



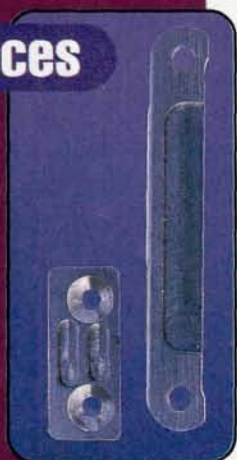
Attention desert rats! Kyosho has upgraded its Sandmaster vehicles. Both the Sandmaster MKII buggy and the ST-2 stadium truck feature cool new graphics, yellow shocks (on the ST-2) and Kyosho's powerful new GX-12 pull-start engine. If you wanna go gas,

the Sandmasters are the perfect way to get started, and now they're even better! For more on the Sandmasters, contact Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (217) 398-6300.

Brian's Braces

Those cool new Double-X and Double-XT anodized-aluminum

braces that we saw on Brian Kinwald's ROAR Nats-winning car and truck are now available from Team Kinwald/Trinity Products. The front, machined-aluminum, front-suspension arm brace on the left (part no. 3002) is designed to strengthen the front bulkhead and minimize front arm flexing. The rear transmission brace on the right (3003) helps strengthen the tranny/bulkhead connection and also minimizes flexing. Both braces are blue anodized and are listed at \$8.29 (front suspension) and \$7.99 (rear transmission). For more info, contact Team Kinwald/Trinity Products at 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



EXPLOSIVE ESC

New from Dynamite is the Power Pulse electronic speed control. This new unit is fully proportional in forward, reverse and braking. According to the folks at Dynamite, this is achieved with BTS technology (Backstop Time Sharing). When the throttle is pushed back in the reverse direction, the Power Pulse activates braking for 1 second then switches into reverse.

Other hot design features include a thermal-overload protection, fuse protection and Power Boost BEC circuitry (the BEC circuit effectively powers the steering servo, even when the battery has dumped to the point at which it will not propel the vehicle any further). Six high-power MOSFETs will handle even ultra-hot 13-turn modified motors with either 6- or 7-cell packs—not bad for a reversing ESC! Two LEDs and two pots allow easy setup and adjustment. So, if you're looking to pack a little bit of explosive in your car without having to blow up your savings account, check out this unit; it's bound to make a big boom in the hobby!



A Sticky Situation

Gooey, spooey, tacky, spooey, sticky, schloopy—and even a little bit icky. What am I talking about? Surprise! I know the answer to this one! Traction, that's it. Spray your off-road tires with Team Associated's new Traction Action, and watch their stickiness increase on all hard-packed dirt surfaces. Formulated to increase the adhesion of super-soft rubber compounds such as Pro-Line's M2 and Team Losi's Silver, Traction Action can give you the extra bite you're looking for—and the edge over your competitors. Oh, it works on asphalt and concrete, too! Contact Associated for more info.



Hawg your Parking Lot

Remember those cool ZR-80 Speed Hawg tires that we showed you in the March issue "Scoop"? You know; the ones that look like real Goodyear Gatorbacks? Well, Uncle Todd and Brother Tim at Pro-Line have been burnin' the midnight rubber to bring sedan racers their own versions of the Speed Hawgs—called, well...what else, but the Sedan Speed Hawgs! These low-profile tires, which are molded in Pro-Line's exclusive "M" rubber, come in both standard (part no. 1086) and wide (1087) versions that fit all Tamiya, Yokomo, Kyosho and HPI touring-car wheels.

THESE YOKES ARE NO JOKE!

Greater Hobby International (GHI) is the exclusive U.S. distributor of Yokomo products. Among the new releases from Yokomo is the YR-4M 4WD sedan (right) that swept the NORRCA On-Road

Nationals. The kit includes: the new ultra-rigid "M" graphite chassis with a saddle-pack battery configuration; new "M" red-anodized racing shocks; new one-way direct main gear; new, solid, lower suspension arms; new 5-spoke rear wheels and new ultra-narrow front wheels; and a complete set of bearings. Top this car off with Yokomo's sleek Calsonic Nissan Skyline body, and you have the same car as Masami Hirotsuka used to win the NORRCA Nationals.



Also new is the FWD TRF-2 touring sedan (left). I can't tell you too much about this car, because I only caught a glimpse of it. I do know that it has a rigid, fiber-glass, double-deck chassis with an in-line

battery cradle; a fully independent and adjustable front suspension with upper and lower wishbones; and a fully independent and adjustable trailing-arm rear suspension. For damping, the chassis uses tiny coil springs (no oil-filled shocks), and the system

works very smoothly.

I've been told that Masami Hirotsuka is unstoppable with this ride. Who knows? Maybe you'll be unstoppable, too. GHI (714) 921-0322



Barry Baker Wins Japanese Nationals

Driving a Yokomo YRX-10 with a 13-turn Maxtec motor, Orion batteries and Pro-Line/Jaco tires, American R/C racer extraordinaire Barry Baker took an impressive win at the recent JMRCA Pro-Ten Nationals in Japan. To win, Barry had to beat the best Japanese drivers, including Masami Hirotsuka, on their home turf! Congratulations, Barry!

AWESOME!

The Pointblank Vampyre is 1996's Hottest ROAR Legal Stock Motor for Buggies & On-Road Racing

The Vampyre Features All The Latest Epic Technology Like:

Laydown Brushes for more brush overlap and rpm's

Short Slotted Armature™ has less mass, better cooling, more rpm's

5.2v. Wet Magnets are the most powerful and thickest available, they produce the strongest possible magnetic field for maximum power

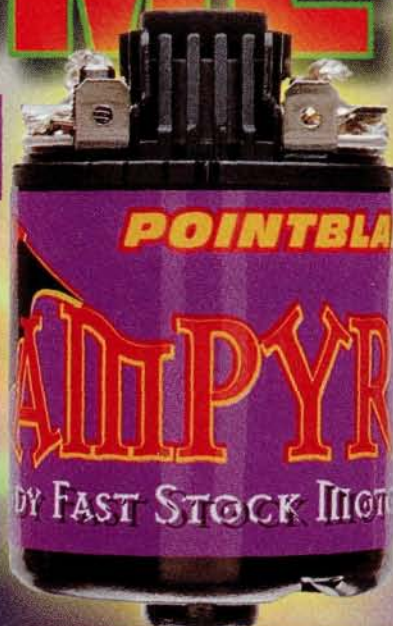
1.3mm Thick Can improves the magnetic field produced by the 5.2v Wet magnets by reducing magnetic leakage through motor can.

Internal Flux Collector™ balances magnetic field at the open end of the motor can, reduces magnetic leakage

Available only at your favorite R/C hobby shop!

P360, Normal Rotation, \$40.00

P370, Reverse Rotation, \$40.00



POINTBLANK™



has you covered

RPM has just introduced molded gear covers for the Associated RC10B2. Two models are available: one for the standard slipper-clutch tranny (part no. 8028); and one for a Hydra Drive-equipped tranny (8032). Both models include a slipper/Hydra Drive adjustment port with rubber cap, and they're molded out of tough nylon for extra durability. RPM has also released a new Mini Bumper for the B2 (8051). It's lightweight, extra rugged and looks very stylish, too!

Also new is the Module Removal Clip (80550) for the Airtronics XL2P and CS2P. The clip is attached to the RF module and provides a gripping surface for your thumb and forefinger. Now all you have to do is pull up on the module clip, and the module is in your hand. It sure beats using your fingernails or a screwdriver.

Contact RPM for more information.



Sproul Rules

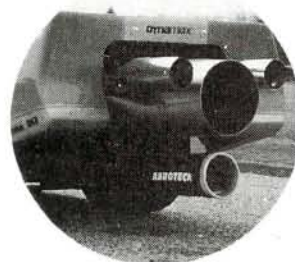
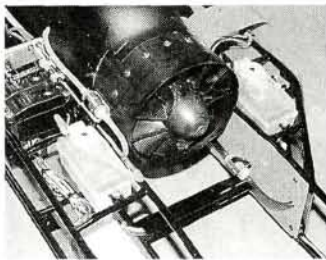


These photos show the nearly complete "Fantasy" — a 1/4-scale Funny Car built by Dave "Rocket Man" Sproul of Mahomet, IL. Long-time readers will remember "Scoop" photos of Dave's car during its early "primer" stages. Now, Dave

is nearly ready to "not only establish a new 1/4-scale record, but also to shatter the existing IEDA record of 105mph." Could he pull this off?

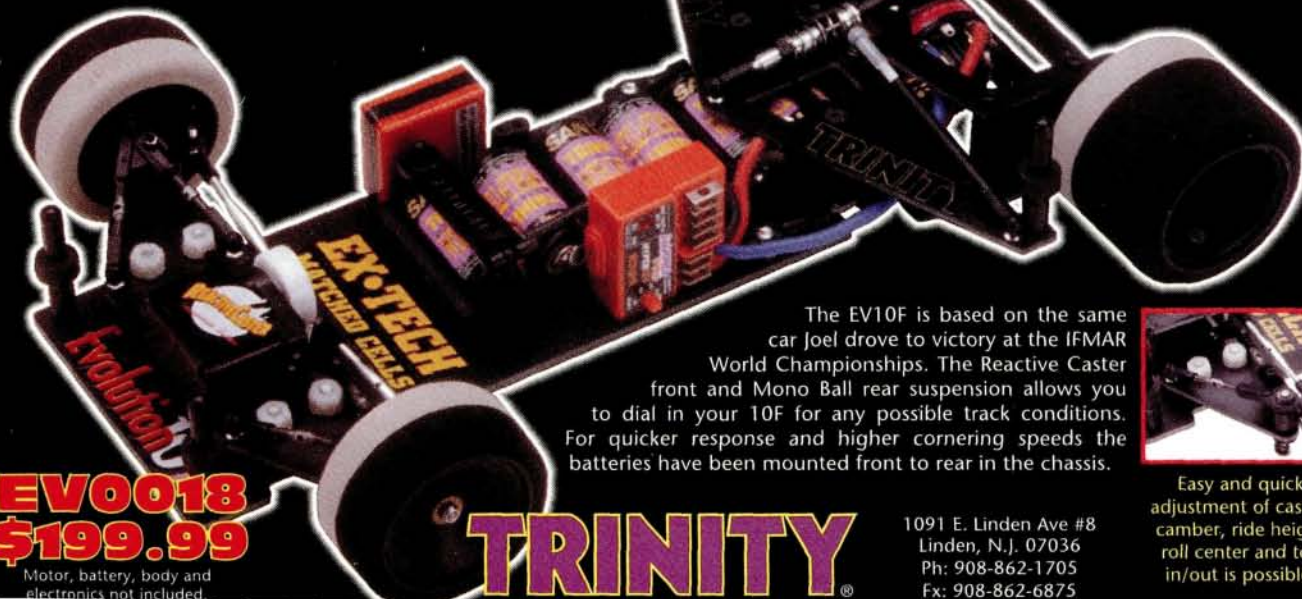
Looking at the Fantasy's ducted-

fan O.S. engine and rocket engines, not to mention its NASA-like construction, I'd say it's a sure bet. What's Dave's prediction?: "150mph, if we can keep it earth-bound!" We'll keep you posted.

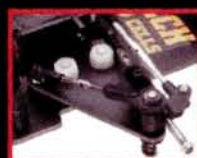


EVOLUTION 10F™

The Fiberglass Version Of Joel Johnson's IFMAR World Championship Winning EV10!



The EV10F is based on the same car Joel drove to victory at the IFMAR World Championships. The Reactive Caster front and Mono Ball rear suspension allows you to dial in your 10F for any possible track conditions. For quicker response and higher cornering speeds the batteries have been mounted front to rear in the chassis.



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READERS' rides

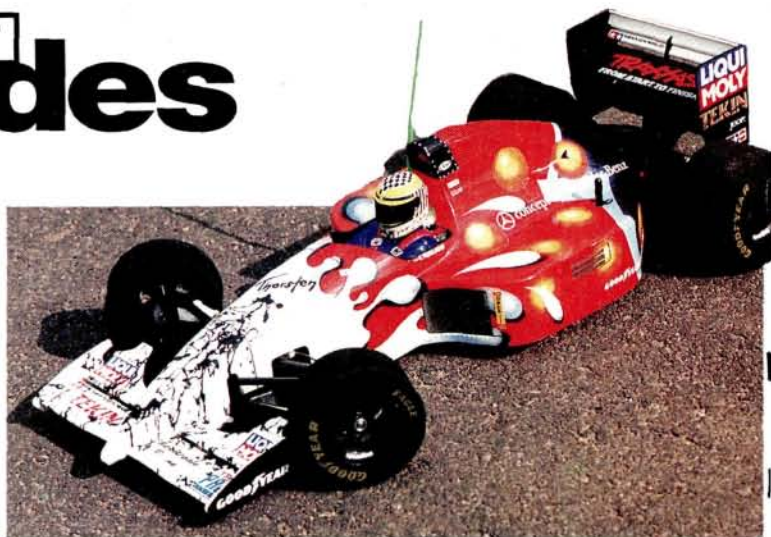
STILL GOING!

Larry Zimmerman, who brought us the Teenage Mutant Ninja Turtles van last year (May 1995 issue), is still adding to his never-ending collection of R/C theme vehicles. This time, the Energizer bunny



thumps its way into "Readers' Rides." This R/C rabbit is based on a 1/10-scale Cobra pod and a Lexan frame. A Novak M5 ESC and a 540 stock motor provide the power to keep this bunny rolling. Its arms drum, its head turns, and its feet alternately fall and rise.

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



TRICK TAMIYA

This Tamiya Sauber C12 F1 comes all the way from Thorsten Gora of Stockstadt, Germany. This parking-lot racer is basically run box stock, and it's equipped with an ACOMS radio system, a Tekin receiver, a Traxxas XL-1 ESC and a Tamiya ball-bearing kit. Thorsten races this F1 on a small, indoor track, and it boasts good handling, long run times and superior speeds. He painted the fantastic-looking body using Pactra paints and a Paasche air-brush. Looks like a concours winner to us, Thorsten!



TAKIN' IT TO X-TREMES

Todd Moyer of Boynton Beach, FL, is the proud owner of this X-treme racing truck. This killer Clod is based on an ESP chassis with BAM suspension and a cantilever shock setup. With an overall length of 2 feet and a width of 16½ inches, the X-treme is stable enough to spin in circles and still keep its Pro-Line tires firmly planted on the ground. The truck is powered by Trinity modified motors and a Futaba radio system, and a Tekin ESC rounds out the electronics. It's topped off by an MRC World Scale body.



CATCHIN' SOME AIR—AND AN RC10

Ron Hardy of Renton, WA, sent us this shot of a midair battle between his Associated RC10 Team Car and his friend's Team Losi Double-XT. The RC10 features all the available RPM, MIP, Lunsford and Kimbrough upgrades, and it's equipped with Airtronics radio gear, a Tekin P12 ESC and a Trinity Green Machine motor. The Double-XT is equipped with Futaba radio gear, a Novak ESC, Tecnacraft tie rods and a Race Prep Purple Haze motor. Well, Ron, it looks as if you guys need air-traffic controllers instead of turn marshals at your track.



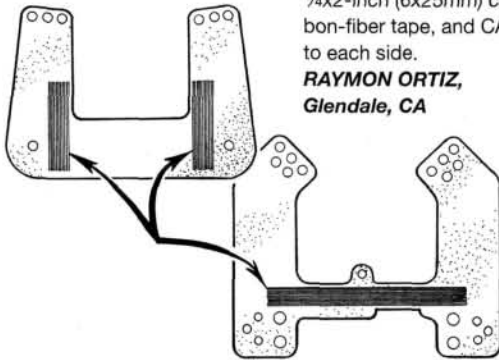
PIT TIPS

by Jim Newman

Lazer ZX-R, ZX-RR Tower Fix

If you crack the shock tower at its weakest point or need to strengthen it to suit your conditions, cut $\frac{1}{4}$ x2-inch (6x25mm) carbon-fiber tape, and CA it to each side.

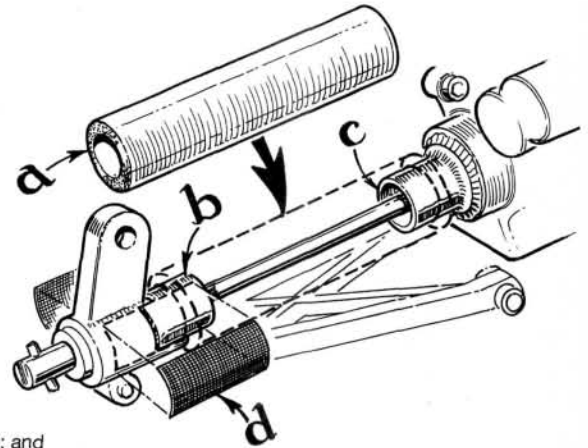
RAYMON ORTIZ,
Glendale, CA



U-Joint Protection

To keep dirt out and lubricant in for extended U-joint life, use $\frac{1}{2}$ -inch-o.d. x $3\frac{1}{2}$ -inch (13x89mm) surgical rubber tube (a); $\frac{1}{2}$ -inch-o.d. x $\frac{1}{2}$ -inch (13x13mm) brass tube notched at one end (b); $\frac{7}{16}$ -inch-o.d. x $\frac{5}{8}$ -inch (11x16mm) brass tube or eyelet flanged at one end (c); and $\frac{7}{16}$ x $1\frac{1}{16}$ -inch (11x18mm) fine metal screen (d). Glue the parts to the hub carrier and transmission case as shown, grease the joints, then assemble the rubber tube over the ends of the brass tubes.

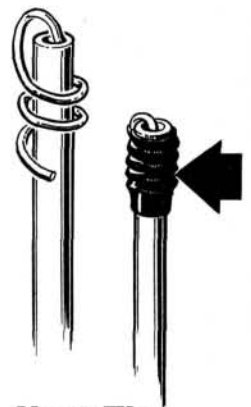
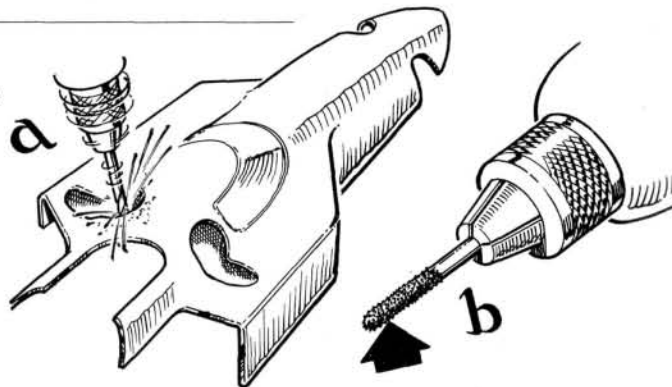
MIKE ROMMEL, Prince George, BC, Canada



Rout-A-Hole

Use a $\frac{3}{32}$ -inch (2.5mm) bit in a high-speed electric drill to carve out holes (a) to provide clearance for shocks, controllers, etc. Better yet, pick up a Robart tungsten-carbide router bit (b) from your hobby store.

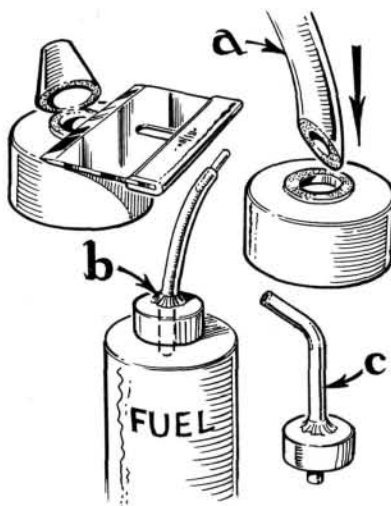
EDWARD THIAN,
Selangor, Malaysia



Neat Tip

After feeding the antenna wire up through the plastic tube, secure the end neatly with a piece of heat-shrink plastic sleeve.

BYRON WOLFE,
Honolulu, HI



Cheap Squeeze

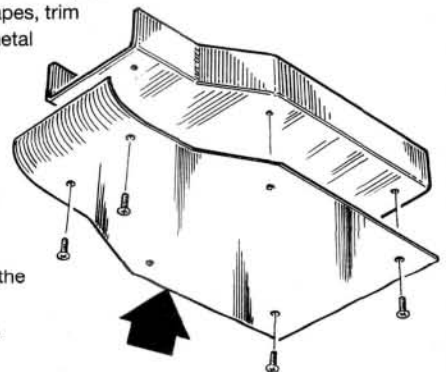
To make an inexpensive fuel bottle, cut the nipple out of an empty contact-lens solution bottle; angle-cut the end of a piece of tight-fitting silicone rubber fuel line (a); then force it through the hole. Seal around the hole with Zap-a-Dap-a-Goo or PFM. Note the little plastic or brass tube nozzle in the end. You might find it more convenient to use a rigid brass tube (c) instead of the flexible line.

JASON GRZESIKOWSKI,
Traverse City, MI

Protect-A-Bottom

To protect the bottom of your chassis from scrapes, trim and attach thin metal to it with existing screws or double-sided carpet tape. To avoid cuts, be careful when you cut the thin metal, and make sure that you file the edges smooth.

DANNY UMBER,
Danville, CA



Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



TRUBLE SHOOTING

by George M. Gonzalez

The Dogs Won't Stay

I hope you can help me solve an irritating problem. I own an Associated RC10T, and every time I start off on full throttle, the dogbones come out of their sockets. Please help.

STEVEN VEAL II
Richmond, CA

Steven, it sounds as if your truck's rear shocks are mounted incorrectly and are causing the suspension arms to pivot at an extreme angle (too much down-travel). It's either that, or you've set your rear tires with positive camber (the top of the rear

tires are leaning outward), which is very unlikely because no one runs positive camber on an off-road vehicle—do they? If you have an early version of the 10T (the rear shock tower has only two shock-mounting choices), mount the shock on the outside hole of the shock tower and on the middle hole of the suspension arms. If you have a more recent version of the 10T (four shock-mounting choices on the rear shock tower), mount the shock on the inner, middle hole of the shock tower and on the middle hole of the suspension arm. The newer ver-

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897-3035. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

sion of the 10T also has a lower mounting hole on the shock tower, and that requires the installation of an 1/8-inch shock spacer on the inside of the shock shaft. If you don't install the spacer, the shocks will have too much down-travel, and the dogbones will fall out every time you hit a bump. I hope this solves your problem.



Motor Confusion

First of all, great magazine. I've been into R/C cars since I was 8. My first car was a Tamiya Grass-hopper. I also have a totally tricked out Traxxas Hawk and an Associated RC10T, which I'd like to trick out. I'm thinking about getting a Novak Hammer Pro, but I can't decide which motor to buy. Can you help? Right now, I'm looking at machine-wound mods.

I don't feel I'm ready for a hand-wound, and I've already won the stock class in my neighborhood. Also, my stock motor is about to die. I'm really confused with all this "turns" and "wind" stuff. What would be a good battery to buy to get all my goodies running at peak performance? I can't afford anything fancy. Will a simple sport pack suffice? One last thing: how should I set my slipper for a loosely packed off-road track? I really appreciate your reading this and would appreciate a response.

ADAM
(via the Internet)

Adam, the Novak Hammer Pro is a wise investment. It's packed with racing features, yet it's simple to install and operate. It will easily handle a modified motor, which brings us to your first question. Most machine-wound motors on the market are of good quality and will satisfy your need for speed.

A motor's "turn" is determined by the length of the copper wire that's wrapped (turned) around the motor's armature. A motor's "wind" is determined by the number of copper-wire strands that are wrapped around the armature. A 12-turn triple motor has three strands of wire wrapped 12 times around the armature, and a 15-turn single has a single strand of wire wrapped 15 times around the armature. A shorter wire is wrapped fewer times around the motor's armature and will develop more horsepower. For example, a 12-turn motor is more powerful than a 15-turn motor.

Motor wind is determined by the thickness

and the number of strands that are wrapped around the armature. For example, a single-wind motor has a single, thick strand of wire wrapped around the armature, and a triple-wind motor has three thinner strands of wire wrapped around the armature. Motors with fewer winds have more torque or bottom-end punch than motors with multiple winds.

Therefore, single-wind motors should be used on high-bite surfaces, and multiple-wind motors are better suited to slippery surfaces. Fewer turns mean more power; fewer winds mean more torque.

On to your slipper-clutch question. Set the slipper clutch so that it slips for about 2 to 3 feet before it fully engages the tranny. This is textbook information, but it works.



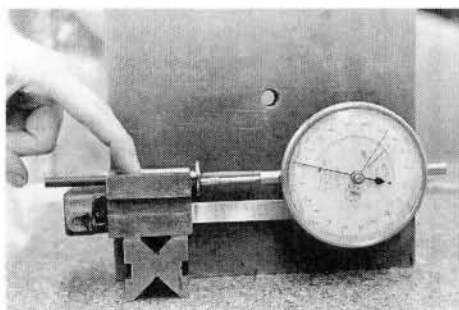
**R/C DOCTOR**

by Doug Mertes

Using this dial gauge and V-block, we measured axle runout. Even the older axles were pretty straight.

Retrued & renewed—how to repair bent hubs

IF YOU'VE run R/C cars for any length of time—especially pan cars with straight axles—you probably have several



The diff-ring face on each hub was also so straight that it didn't need any work.

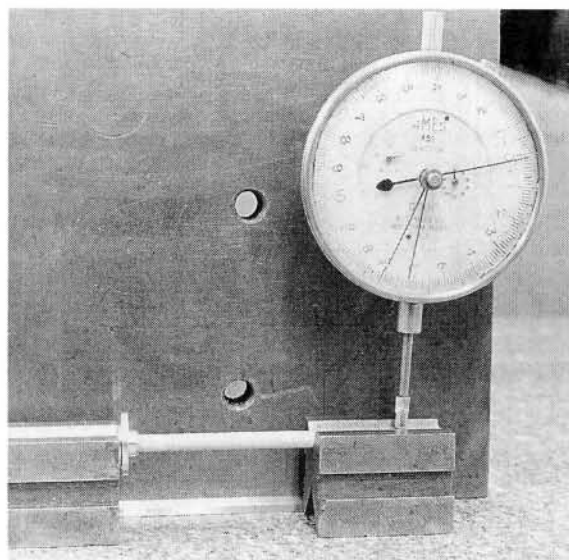
sets of hubs. There's the original set that the car came with, (which are so bent and out of true that they wave at you as they go by.) Then there's the second set that you bought to replace the original ones. The wheel mounted on the left one wiggles up and down a little since you slapped the wall last week. How about that brand-new, high-zoot set of super-

lightweight hubs that you picked up at the hobby shop last week? Are they really straight and true?

WHY BENT HUBS SLOW YOU DOWN

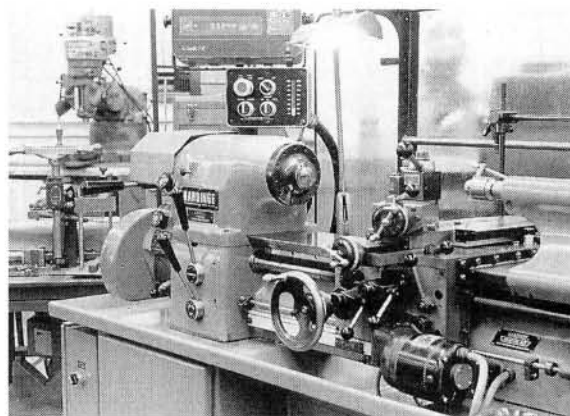
Not all racers think that straight hubs mounted on their cars will make them faster or handle better. If you have any doubts, try this test: remove the pinion gear, and let the rear of your car hang off the edge of a workbench or a tabletop. Spin the rear wheels, and see if the left- or right-side tires wobble as they rotate. If they're so bent that you notice up and down movement, then they're going to slow you down. Here's why:

- Wheels that wobble as they turn will kill your axle and diff bearings in short order.
- Vibration from an untrue hub causes screws and nuts to back off and can also cause damage to the receiver crystal.
- Un-true hubs reduce



rear pod traction, and they make it virtually impossible to get the rear end of the car planted properly. When the back end is bumping up and down, you'll need a softer tire to get into turns without spinning out. That softer tire will also chunk more easily, and it will always be slower than a

axles that I suspected weren't very straight. Before I threw the whole mess out, however, I decided to see if I could salvage some of them. After all, new hubs are very expensive—usually \$15 to \$25 per side—and I hate to spend money on new parts when old ones can be reclaimed. I gave



This superduper-precise lathe cuts to tolerances of 1/10,000 inch!

hard compound tire. Even a hard compound tire will chunk off on the outer edge if the hubs are sufficiently out of round.

I don't know about you, but these are all important things to me!

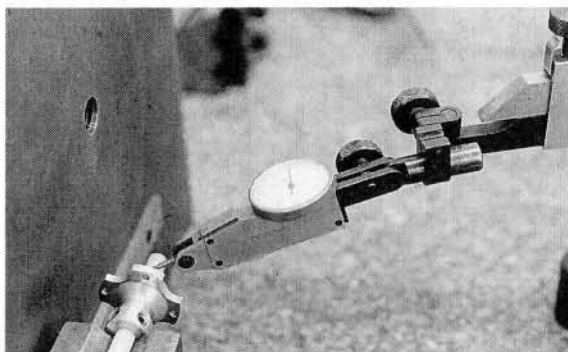
CAN BENT PARTS BE SALVAGED?

In my years of driving pan cars and Formula 1 cars, I've collected more than my fair share of bent left- and right-side hubs. I've also had a handful of

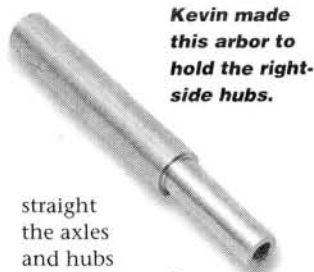
my master-machinist friend and fellow racer Kevin Byrne a call, and he agreed to see if we could make them worth mounting once again. Boy, was I glad I did! Read on, and see how we fixed every one of those old hubs and how I learned a bunch about machine work at the same time.

HOW TRUE ARE THEY, KEVIN?

The first thing Kevin did was to find out how



The left-side hubs were a different story. Wiggle city!



Kevin made this arbor to hold the right-side hubs.

straight the axles and hubs actually were. If they were really bent, he wasn't going to mess around with them, because it would require removing so much material that a rim wouldn't fit properly on them any more. So, he set up a couple of V-blocks on a heavy, flat, granite table, and he used a very sensitive dial indicator (it measures in $\frac{1}{10,000}$ inch) on a magnetic base to measure the runout of the axles and hubs. It turned out that most of the axles were still very straight; a new IRS* axle had only $\frac{1}{10,000}$ inch runout, while a new Niftech* axle had $\frac{3}{10,000}$ inch runout. My very first IRS axle, which I now use as a spare, had only $\frac{5}{10,000}$ inch runout, which was still very good in Kevin's opinion. We also measured the runout of the face of the differential "top hat" mounted on the axles. The after-market axles we were measuring had obviously been made well, because the worst runout that we measured was only $\frac{2}{10,000}$ inch—certainly not enough to worry about

hurting diff action!

The hubs, however, were a different matter. Even the new hubs had runout measured in several hundredths inch—much more than any of the axles had. Some of them had wobble that was much, much worse. We used both a face jig and a height gauge to find out how much they were off, and there was usually both vertical and back-and-forth wiggle. That's what happens when you're in a bad crash on the oval!

HOW DO YOU FIX IT?

First, we made a tooling device called an "arbor." This is a metal piece that holds the part you want to machine, so that the part isn't distorted by the chuck of the lathe. Kevin wanted to get really fancy and true both sides of the hub in the same arbor, so he designed the one you see here. It's made of a piece of $\frac{1}{2}$ -inch-thick, 3.75-inch-long lead alloy steel (steel/lead alloys machine very cleanly) that's turned down to $\frac{3}{8}$ inch for the last $1\frac{1}{4}$ inch. Observant readers will note that this is the same diameter as the outside of a rear axle bearing. The diff-side hubs slip over the

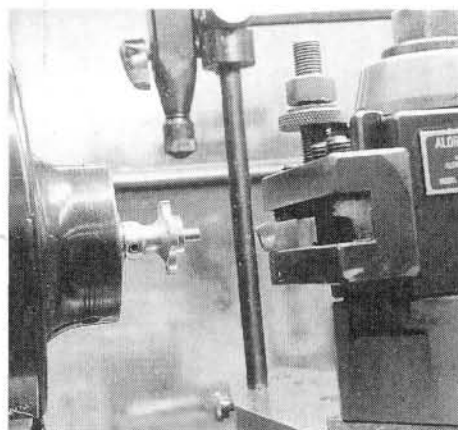
small end and are held on by a socket-head screw and washer that fit into a hole that Kevin drilled and tapped in the small end of the arbor. When mounted, the hub is held tightly enough to allow machining, but not so much that it gets squashed, which would bend and distort the hub.

The large end of the arbor was then placed in a Hardinge lathe, which is also accurate to $\frac{1}{10,000}$ inch. Using carbide cutting bits, the right-side hubs were spun in the lathe one at a time, and both the diff face and outside face of each one was trued to perfection.

To take care of the left-side hubs, we inserted a piece of $\frac{1}{4}$ -inch-thick steel stock in the lathe and mounted the hubs on it, just as if it were an axle stem. We even used the setscrews that were already in the hub bases. This time, Kevin only had to true up the face and flange of most of the hubs, although he was so annoyed at how some of the outer edges bobbed up and down that he also cut them down. He made sure that none of the rim-mounting flanges on the faces of either the left or right hubs was less than 0.6420 inch in diameter. Any smaller than that, and the rim would float around too loosely on the face of the hub, and only the screws would keep it tight. The center flange locates the rim on the hub, and he didn't want all of his hard work to be wasted by a wiggly wheel.

WERE WE SUCCESSFUL?

You bet! Take a look at all of the hubs that were rescued from the reject pile! Some of these are five and six years old, and



they were all headed for the garbage. Now, every one is perfectly true. I'll get super-smooth differential action, too, because the diff-ring faces are perfectly smooth and square to the axle. The wheels on the back end of my ride will run nice and flat on carpet and asphalt, and I'll get maximo traction and a whole lot less bounce!

Was it expensive?—not if you consider the number of hubs that were fixed. If you and your R/C buddies had a dozen or so hubs, you could probably take this article with the picture of the arbor to a local machine shop and get them to do the job for an hour's labor. Throw in materials, and Kevin estimates that you could do that many hubs for under four bucks apiece.

The right-side hubs had both the wheel face and the diff face cut on the same arbor so that they would be true to each other and to the axle.



Master machinist Kevin Byrne cuts a left-side hub.



This pile of hubs was done in little more than an hour. Reclaim-o-ramal

Considering the high cost of a new pair of hubs, and the performance gains that I guarantee you'll see, that's a "true" bargain!

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.



Setting Ride Height

If your off-roader's suspension isn't perfectly dialed in, its handling is probably too loose or too tight. That is what this month's column is about—tightening up what's loose and loosening up what's tight. But to remedy any problem, you must first understand it.

If the rear end of your car or truck tends to spin out or slide through the corners, you have a "loose" condition. If the front end doesn't want to turn or tries to push through the corners, you have a "tight" condition.

MAKING ADJUSTMENTS

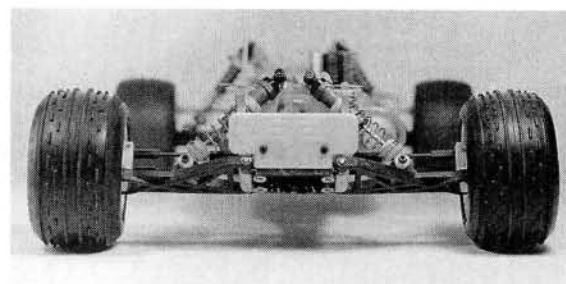
One of the key settings that affects handling is ride

height—how high the bottom of the chassis sits off the ground. For most off-road vehicles, ride height is controlled by the position of the spring-adjustment collars on the shocks. Raising the collars lessens the pre-load on the spring i.e., how much the spring is compressed between the collar and the shock's spring retainer and lowers ride height. Lowering the collars increases spring pre-load and raises the ride height.

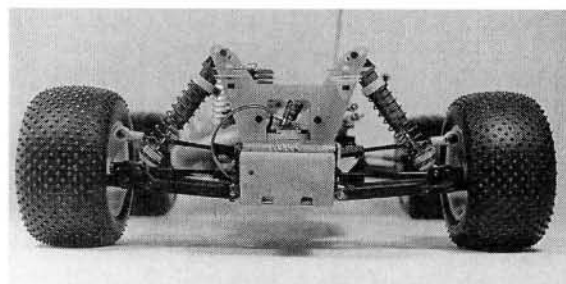
When adjusting ride height, follow these rules.

- Adjust the spring collars a little at a time. Adjustments of $\frac{1}{16}$ inch are just right.
- Always move the left-side and right-side shock collars equally.
- Adjust only one end of the car at a time, either the front or the rear, but never both. If you make too many changes all at once, you will never know which change made the car handle worse or better.

Ultimately, you want to find a spring/ride-height combination that allows the rear A-arms to be level with the ground, or at most, have the rear of the chassis sit just a little bit lower. You also want to have the front of the chas-



Setting the ride height correctly is crucial to your R/C vehicle, and what's "correct" will depend on the results you're aiming for. Here's an example of a good starting point for a typical off-road front suspension. Notice that the front-suspension arms are level.



This is a good starting point for the rear end of an off-road vehicle. Notice that the rear suspension arms are just slightly below level. Adjusting the ride height is as easy as raising or lowering the shock collars on the shock bodies. To get an accurate ride-height reading, drop the vehicle from about 6 inches onto a flat surface. The ride height will be the point at which the suspension arms settle.

sis to be no more than $\frac{1}{8}$ inch higher or lower than the rear of the chassis. Any variance from these guidelines will create problems in other areas, such as on jumps, moguls and bumps. Keep this in mind when following the procedures outlined below.

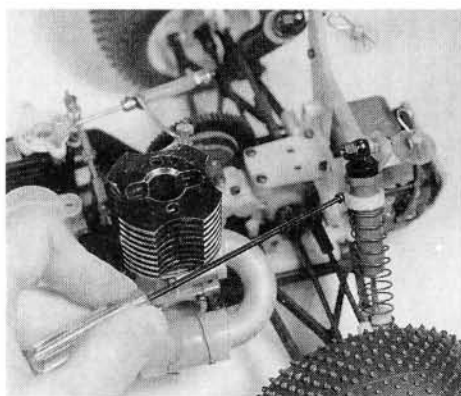
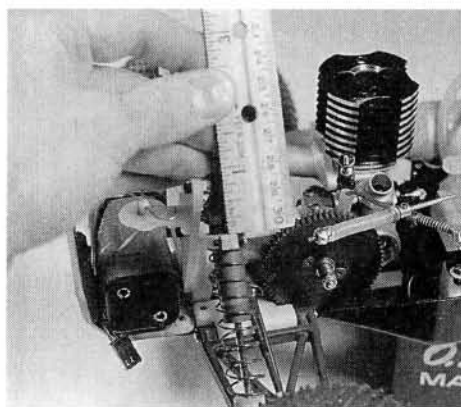
SLIP-SLIDIN'

To correct a loose condition (not enough rear trac-

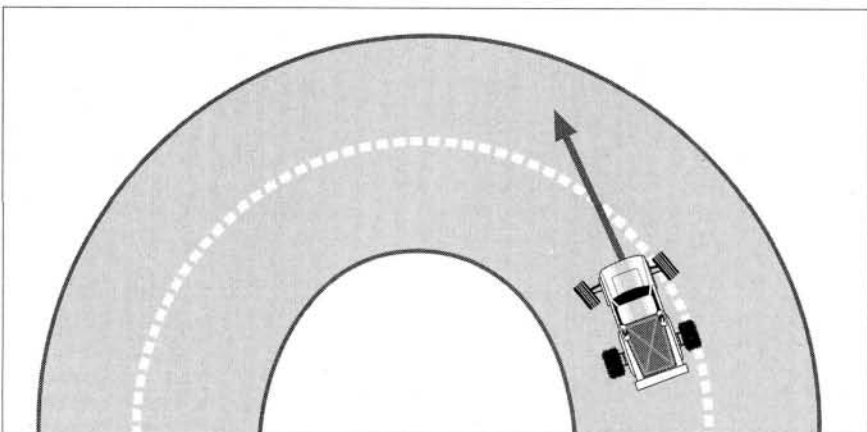
tion) you can:

- Raise the rear shock collars to lower the rear-end ride height.
- Lower the front shock collars to raise the front-end ride height.
- Replace the front shock springs with stiffer springs.
- Replace the rear shock springs with softer springs.

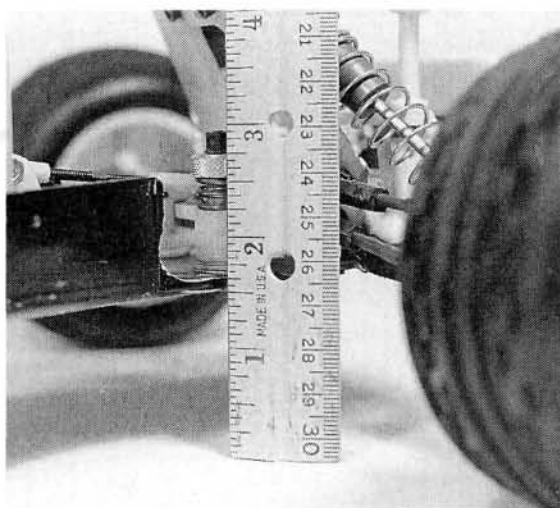
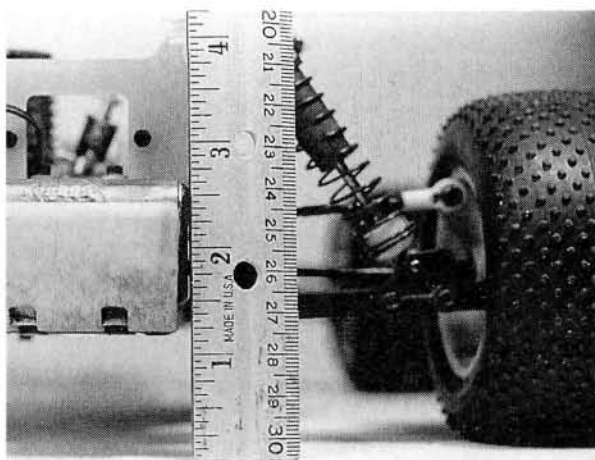
- **Rear shock collars.** I suggest that you raise the rear



To make more accurate spring pre-load adjustments, use a ruler to measure the setting on each shock, and then compare them. Accuracy is the key here, folks!



Tight or push condition (understeer).



As you can see, the rear end has a ride height of 1 1/4 inches, while the front end has a ride height of 1 1/2 inches—a textbook setup that really works. To remedy a hooking problem, raise the front end; for more steering, raise the rear end.

shock collars first. Run the car to check for results. If rear-wheel traction increases, you know you are adjusting in the right direction. Raise the rear shock collars another 1/16 inch and drive the car again, noting the changes. While making adjustments and testing, keep a close eye on your ride height. If you get too low in the rear, ground clearance can become a problem and will create an entirely new set of circumstances. Continue to move the shock collars upward until you achieve the correct amount of traction, or you lose the necessary ground clearance. Lowering rear ride height too much, however, can cause a loss of traction.

• **Front collars.** When ground clearance becomes an issue, it's time to focus on the front end. Lower

the front shock collars to raise the front-end ride height. Run the car to check for results. If rear-wheel traction increases, then lower the front shock collars another 1/16 inch, while keeping a close eye on ride height. If you run out of room for shock-collar adjustment and still haven't obtained the desired amount of traction, the next course of action is to change the springs.

• **Springs.** Before you change springs, put the car back to its original ride-height settings as recommended in its instruction manual. To gain rear traction, change to softer rear springs or stiffer fronts. This is a general rule, to which there are exceptions, of course.

After changing the springs, check ride height again, because stiffer

springs will usually increase ride height and softer ones will generally decrease it. Run the car to see how your changes affected its handling. If the car is still loose coming out of turns, follow the same procedure you used on shock-collar adjustments for a loose condition. If you change to a stiffer spring up front and find that the car still lacks rear traction, follow the procedure you used for a loose condition.

A spring change makes a large change to the suspension. You might find that, by changing to a softer spring in the rear or a stiffer spring in the front, you change the handling 180-degrees in the other direction, going from being too loose to now being too tight. This brings up our next condition, "too tight."

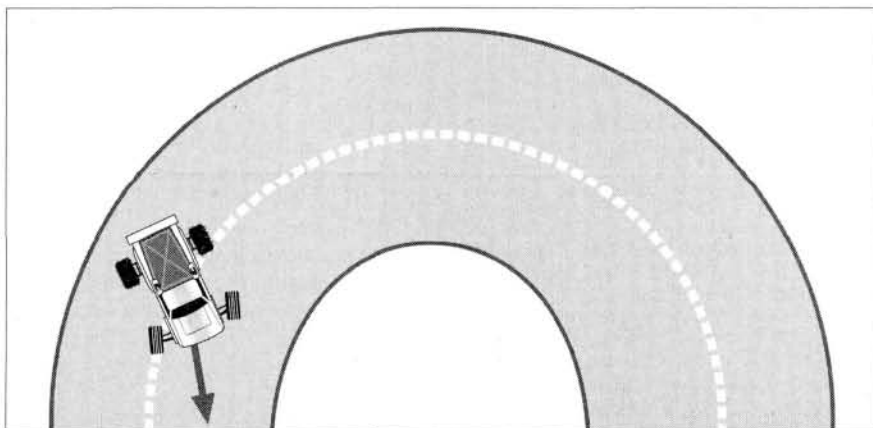
GETTING PUSHY

Now let's take a look at the tight condition. If the car doesn't want to turn in the corners, the car has a "push" or is tight, i.e., it has too much rear traction or not enough front traction. Generally, there are four ways to fix a "tight-handling" car:

- Lower the rear shock collars to raise the rear-end ride height.
- Raise the front shock collars to lower the front-end ride height.
- Replace the front shock springs with softer springs.
- Replace the rear shock springs with stiffer springs.

• **Front collars again.** I suggest that you start by raising the front shock collars 1/16 inch. Run the car and check for results. If the front-end traction increases and the car exhibits more steering, continue to raise the front shock collars 1/16 inch at a time.

When you run out of ground clearance in the front, lower the rear shock collars instead. By now you should be seeing a trend. Modify all the things as you did for a loose condition, but in exactly the opposite way. If you previously put on softer springs in the rear to get more traction, use stiffer springs to get less traction, and vice versa, for the front.



Loose condition (oversteer).

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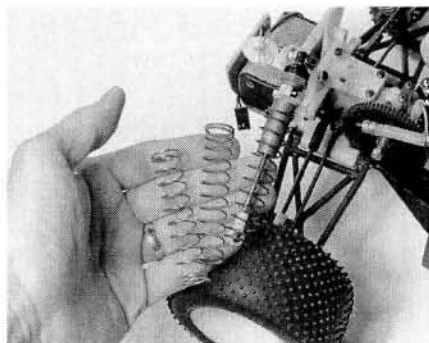
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GETTING STARTED



Ultimately, you want to find a spring/ride combination that allows the rear suspension arms to be level, or slightly lower.

USE A BASIC SETUP

Whenever you get confused about your setup, always go back to the one that the manufacturer recommends in the manual, and start over again. If you don't have a manual, use the following as a starting point: set the car on a level surface, such as your workbench or kitchen table. Install all the components that the car needs to run, e.g., speed control and battery. On all four shocks, install the softest set of springs you have. If one pair of springs is softer than the other, place the softer set on the rear shocks and the firmer set on the front shocks.

Set the rear shock collars to make the rear A-arms parallel, or just slightly below parallel, to your workbench. Now set the front shock collars so that the front of the chassis is even with the rear or just a tad ($\frac{1}{16}$) higher. Always use this basic setup as a starting point. Don't be afraid to play with a variety of different setups. When you make changes, record them. For example:

- **Action:** raised rear shock collars $\frac{1}{8}$ inch using black springs.
- **Result:** good traction out of the corner, but bottoms out on large jumps.
- **Track condition:** damp, good traction, very rough.

Notes like these are excellent reference guides and can really help you see and feel how the suspension is working. It is very difficult to remember from week to week how your car handled with every setup you tried. Recording your observations gives you a big advantage in that it saves time on race day, allowing you to achieve the proper setup by following your notes rather than by guessing.

A complete understanding of how your suspension works is an advantage that money can't buy. This alone will win more races than any high-zoot hop-up on the market. ■

New



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Traxxas XL-1

WHAT HAS survived the test of time and will improve the performance of your favorite backyard dirt-burning R/C car or monster truck? The Traxxas* XL-1 electronic speed control (ESC). I ran into my first Traxxas XL-1 back in 1989, and I was quite surprised when a brand-new one showed up. ESCs are changing so fast that they sometimes come in a box that has a paste-over label announcing the new model number. An ESC that survives the test of time must have features that make it a winner. Let's see what the XL-1 has.

On an R/C car, the mechanical speed controller is usually the first thing to burn out, because when we put the pedal to the metal, a lot of current flows through it—as much as 25 amps with today's battery/motor combinations. Dirt also contributes to the wear; it grinds the silver or gold plating off the contacts, and soon, the "go" has all gone. The Traxxas XL-1 avoids all these problems because it doesn't have any contacts to burn out. All the current is handled by the 12-MOSFETs transistor—switching action

without moving parts.

TRAXXAS TRY-OUT

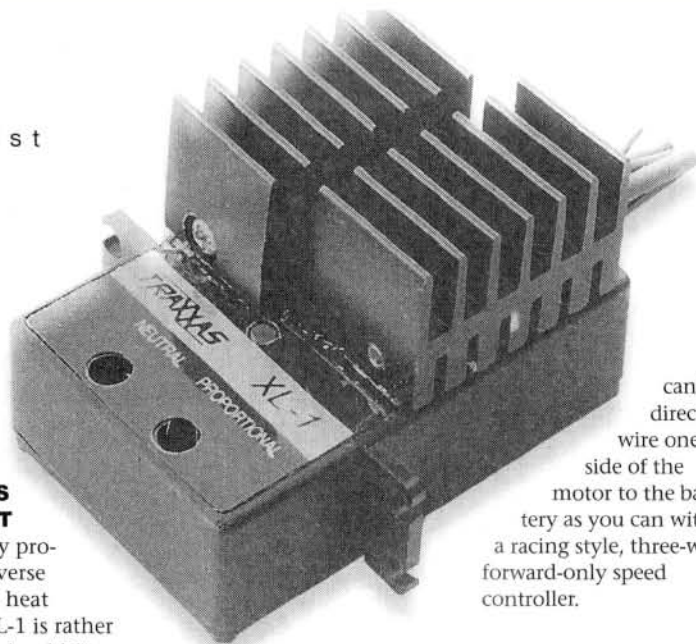
With its fully proportional reverse and massive heat sinks, the XL-1 is rather large, but it should fit most 1/10-scale cars. But it should truly be at home in a single-motor monster truck that runs on a wheelie-popping 7-cell pack. The instruction sheet is a little skimpy; it would be nice to have a drawing that shows how it should be hooked up, but installation is easy.

Looking inside, I found that the XL-1 is well-constructed, there's plenty of room for all the parts, and the large-capacity filter caps should help to eliminate glitching.

TEST 1—RESISTANCE

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• Voltage drop along the full length of the battery wires and motor wires: 0.48 volt—a resistance of 0.04 ohm.



can't direct-wire one side of the motor to the battery as you can with a racing style, three-wire, forward-only speed controller.

• Voltage drop 2 inches along the wires: 0.27 volt—a resistance of 0.023 ohm.

My first resistance reading is approximately double the specified resistance of .021 ohm. This is about right, because manufacturers give only the resistance of the FETs and do not include the resistance of the wires, printed-circuit boards and connectors. As the second reading shows, resistance can be substantially reduced by replacing the connectors with high-grade connectors such as those from Litespeed* and Deans*.

If you do decide to replace the connectors, be careful; the Traxxas XL-1 uses red and black leads for both the battery and the motor. If you cut off the motor and battery connectors at the same time, you'll have no way of telling which is which. To avoid a mix-up, replace the connectors one at a time.

Caution: the two red leads are *not* tied together inside the controller (in most forward-only-with-brake speed controllers, they are). There's a reason for this: it allows a reverse polarity on the motor leads when running backward. Because of this, you

TEST 2—OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps.

The Traxxas XL-1 got quite hot, but it didn't fail to pump the 15 amps. If you plan to use it to run a modified motor on seven cells in a heavy truck, be sure that it gets plenty of cooling air, and let your motor and ESC cool off between hard runs.

TEST 3—SHORTING OUT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried.

I placed the dead short across the XL-1's output wires for 10 to 15 seconds, waited about 10 seconds and tried it again. After being subjected to this abuse three times, the Traxxas XL-1 was still pumping juice, but it was too hot to touch. If you insist on forcing it to handle a dead short indefinitely, it may well burn out, but it's tough enough to give you ample time to realize that you have a

WHAT IT HAS

- Fully proportional forward and reverse.
- Large built-in heat sinks.
- Built-in forward/neutral/reverse LED.
- Full set of connectors—Tamiya style for the battery and bullet style for the motor.
- And, of course, an instruction sheet, motor capacitors and a screwdriver for making adjustments.



Here's proof that the Powerzone Comm. Drops are #1 Performance Test

Before
Powerzone Comm.
Drops were added

Constant Volt 5.00					
RPM	TORQ	WATT	EF	AMPS	
15379	1.4	16	50	6.4	
13921	3.0	30	66	8.9	
11993	5.0	44	67	13.0	
9954	7.0	52	58	17.9	
8125	9.0	55	55	23.0	
6160	11.0	50	35	28.4	

Stock motor dyno readouts taken after simulated four minute run using the same motor before Powerzone Comm. Drops were added and after one drop was added.

After
Powerzone Comm.
Drops were added

Constant Volt 5.00					
RPM	TORQ	WATT	EF	AMPS	
15660	1.4	16	47	6.8	
14430	3.0	31	62	10.1	
12591	5.0	46	64	14.0	
10724	7.0	56	60	18.4	
9131	9.0	61	53	23.1	
7272	11.0	59	41	28.2	

18% increase in RPM
17% increase in Efficiency.
18% increase in Wattage Output.

Get these results out of any Stock or Modified motor with only one drop of the Powerzone Comm. Drops.

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NEW

POWERZONE BUSHING OIL

Specially formulated for stock motor bushings. Contains high sulfur oil blended with a tack agent to keep the oil from flinging off.

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SCOPING OUT

serious problem and unplug the battery pack.

FUN RUN

I installed the XL-1 in my MRC MT-10S truck—not difficult, because the factory-installed connectors can be plugged into the same connectors as the mechanical controller was plugged into. Keep in mind that the car must run forward when the XL-1's LED lamp is burning green. If this is not the case, you must flip the reversing switch on your transmitter to correct the problem. If you reverse the motor leads to correct the problem, performance will be very poor because an ESC with

reverse is designed to go more slowly in reverse than it goes in forward.

The on/off switch is mounted in a small plastic housing that allows you to mount it with double-sided tape to any smooth surface. You can also remove it from its case and mount it in the usual oblong switch-mounting hole provided in most chassis.

Following the instructions exactly, I adjusted the ESC to match my Futaba Magnum Sport transmitter, and I had a few problems:

- My car ran backward when I advanced the throttle forward. The motor leads were the cor-

rect polarity, and the "on" LED was bright red, but the instruction sheet doesn't say that red is reverse and green is forward. I had, of course sorted all this out in my lab, so I knew that red meant reverse. I flipped the throttle-reversing switch on my transmitter and the car ran forward.

- The full-on indication wasn't precise. I followed the instructions' recommendation that, when adjusting full-on, you must watch for the setting that gives the brightest LED and the fastest motor output. I achieved the best results when the proportional control was set at its full counterclockwise setting. A quick check with my oscilloscope revealed that, although the setup procedure is not precise, it did work.

From the very first run, acceleration was impressive, reverse was proportional and very smooth, and the brakes worked well. When the battery dumped, I felt the XL-1's heat sinks—a little warm, but not hot, because my MRC MT-10S setup is fast and supplies lots of cooling air.

To sum up: I liked this ESC's large heat sink and smooth handling, but the instruction sheet could use an installation diagram. The LED indicator comes on brightly before you hit full throttle, so you must listen to the motor and watch the LED when you're adjusting the proportional (full-on) control. With a suggested list price of \$75, the Traxxas XL-1 is an excellent buy; it's every bit as good as the original.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■

SPECIFICATIONS

DIMENSIONS

H x W x L1.55 x 1.57 x 2.39 in.
Weight with wires.....3.6 oz.

TUNING

Access to controlsExcellent
Ease of adjustmentFair

LIST PRICE/WARRANTY\$75/30 days

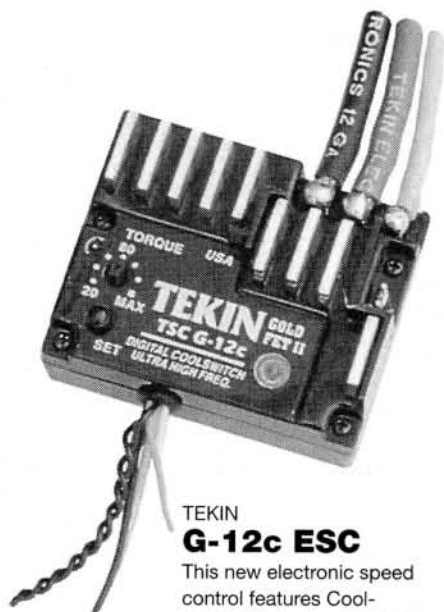
ELECTRICAL (Manufacturer's specs)

Max. voltage9.6 volts
Min. voltage4.8 volts
Max. current150 amps
Continuous current75 amps
Resistance.....0.021 ohm

TEST PARAMETERS

Voltage6 volts
Current12 amps
Voltage Drop
—along full length of motor wires and battery wires.....0.48 volt
—2 in. along the wires0.27 volt
Calculated Resistance*
—along full length of motor wires and battery wires0.04 ohm
—2 in. along the wires0.023 ohm
BEC output, 6-cell battery.....5.57 volts
*Resistance = Voltage drop ÷ Current

COMMENTS: the Traxxas XL-1 is large, but it should work nicely in any monster truck; smooth throttle response; has stood the test of time; a good buy for anyone who's looking for a reversing ESC.



TEKIN G-12c ESC

This new electronic speed control features Cool-Switch™ circuitry for higher power handling, cooler operation, more acceleration and longer run times. Heat sinks are not required, and a special filter helps prevent radio glitching.

Part no.—G-12c; price—\$199.99.

Tekin Electronics, 940 Calle Negocio, San Clemente, CA 92673-6201; (714) 498-9518; fax (714) 498-6339.

PROTOFORM Courage C41

This new 1/12-scale body features an ultra-low center of gravity and a reconfigured tire opening, which makes tire-cutting less of a problem.

Part nos.—1605L; 1605R; price—\$12.95

Protoform, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

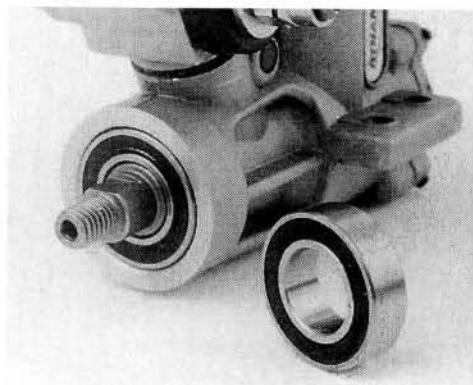
DYNAMITE

Super Seal

This dual-rubber-sealed Class 7 bearing for nitro engines is permanently lubricated and features light-contact rubber seals on both sides, so no air or dirt can enter the engine through the bearing. It's available to fit most .12-size engines.

Part no.—DYN6325; price—\$8.95.

Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355.



RACE PREP

Hack Attack Stock Motor

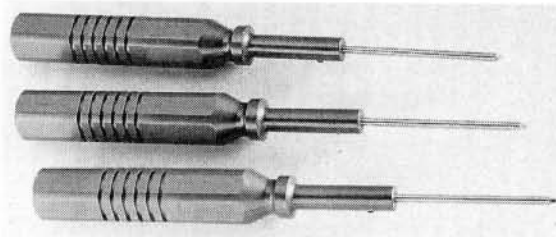
This new 24-degree motor features a new R-40 armature, which is divided into four sections to allow air to cool more of the wire's surface area. The weight of the armature is balanced so that its magnetic field is



never disrupted. It also features 5.3 wet magnets, a 1.3mm-thick can, Teflon™ bushing shims, Race Prep's "R"-compound brushes and three capacitors.

Part no.—RP-244; price—\$40.

Race Prep Racing Motors, P.O. Box 484, Paulden, AZ 86334; (602) 636-1955; fax (602) 636-1956.



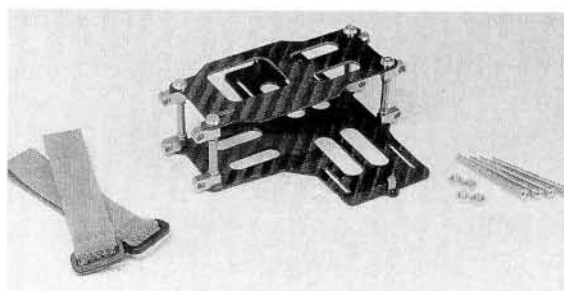
TRINITY

Pro Wrenches

These newly designed, purple, anodized-aluminum wrenches have bigger, easier-to-use handles and feature replaceable full-length drill-blank tips.

Part nos.—RC7362 (.035 Associated tranny wrench); RC7363 (.050 pinion setscrew wrench); RC7364 (.063 wrench); RC7365 (.093 wrench); RC7366 (metric pinion wrench); RC7367 (2.5mm motor wrench); price—\$12.50 each.

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



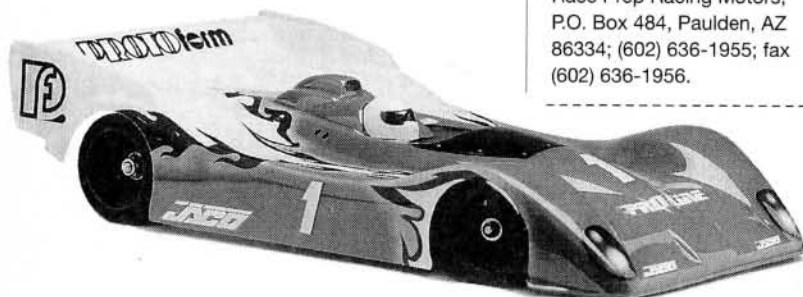
KOSE

Graphite Chassis for the Tamiya Mini Cooper

This graphite M01 chassis is not only lighter and more rigid than the stock chassis, but it will also lower the center of gravity and position the batteries dead center on the chassis. The steering servo could also be placed flat, which provides better geometry. The chassis comes with Velcro®-brand battery straps for easier battery changes, and features high-quality materials throughout.

Part no.—K1206; price—\$90.

Japan R/C Imports, P.O. Box 7009-152, Lafayette, CA 94549; phone and fax (510) 284-5778.



BSR

Tire Caddy

This lightweight, durable, and air- and moisture-resistant canvas bag will hold at least two full sets of tires.

Part no.—8995-10; price—\$22.95.

BSR Racing, Rte. 6, Box 54, AL

35645; (205) 757-1564;

fax (205) 757-1574.



HOT BODIES

1996 Triton body

New for Team Losi's Double-XT, this version of Ford's 1996 Triton concept truck features functional, innovative styling with a distinctive front end and flared sides. This ROAR- and NORRCA-legal body also includes an off-road package, which includes a built-in roll bar, number plates, an add-on spoiler and decals.

Part no.—10401; price—\$18.95.

Hot Bodies, 308 Serrano Trail, Browns Mills, NJ 08015; (609) 893-7716; fax (609) 893-BODY.



RPM

Snap-Tite Body Savers

These thin

little two-piece, injection-molded, black nylon "washers" snap through the body to totally protect and strengthen around the body posts or shock-tower mounting tab. They also cover up the edges of ragged or split holes; they stay in place when the body is lifted off; and they can be reused or switched to a new body.

Part nos.—8030 (Associated Trucks); 8033 (Losi Double-X and Double-XT and 1/4-inch-diameter posts); price—\$2.95 (set of 5).

RPM, 14978 Sierra Bonita Lane, Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.



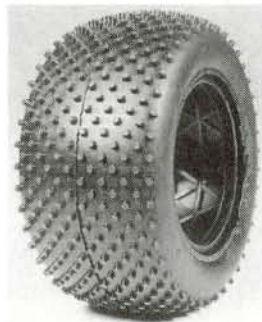
MAXTEC

Power Drops

Power Drops contain the latest high-speed lubricants and molecularly bonded protective additives, so they reduce motor heat and eliminate brush glaze. That means more power and a longer motor life.

Part no.—MX-101; price—\$10.95.

Maxtec Development, 3740 Overland Ave., Ste. B, Los Angeles, CA 90034; (310) 815-0251; fax (310) 815-0253.



TEAM LOSI

IFMAR Stud Truck Tire

Based on the popular IFMAR Stud buggy tire, these new truck tires feature a sturdy lug design that works well in nearly any conditions, from medium to loose dirt, and is great in the bumps. They are available in the race-proven Silver compound and come with foam inserts. They fit all popular rims.

Part no.—A-7639S; price—\$17.95

Team Losi Inc., 13848 Magnolia, Chino, CA 91710; (909) 465-9728; fax (909) 590-1496.

KYOSHO

Nostalgic Series

Part of the "Pure Ten" class, these cars combine today's nitro technology with the look of yesterday's automobiles. They feature narrowed chassis and bodies, full-scale realism, a Kyosho GS-11X engine with recoil starter, a double-differential belt-drive transmission, fully independent suspension, and a large-caliber disk brake.

Part nos.—KYOC471 (Ford GT 40); KYOC473 (Ferrari 250GT); KYOC474 (MGB MK 1); KYOC475 (Ferrari 330); KYOC476 (Corvette Stingray); price—\$369.99 each.

Kyosho; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 251 Danbury Rd., Wilton, CT 06897-3035.



ASSOCIATED LAUNCHES ITS STEALTH

by Frank Masi



LIKES

- Plenty of steering.
- Works "awesome" on bumpy tracks.
- Overall excellent parts quality and fit.
- Clear and comprehensive instructions/tuning tips.
- Easy maintenance.
- Much better than the old RC10.
- Very sensitive to tuning changes.



DISLIKES

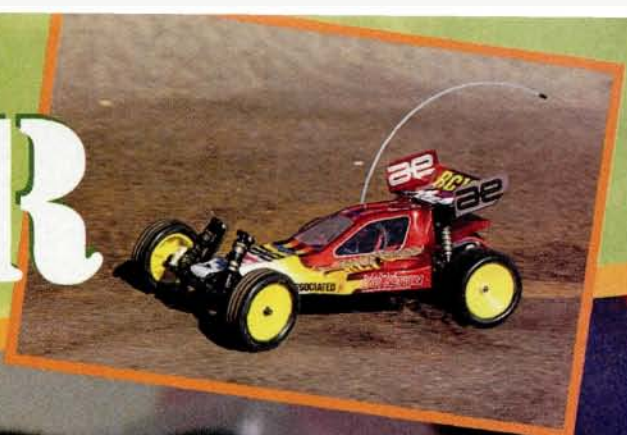
- Leaking shock caps on my kit (see text for more details).
- Very sensitive to tuning changes.
- I still can't beat Matt Francis!

TEAM ASSOCIATED RC10B2

IF YOU'RE IMPATIENT, I'll save you the trouble of reading this article to the end: Team Associated's* new RC10B2 is better than the old RC10 in every way. If you're interested in finding out *why* it's better, read on!

PHOTOS BY JOHN HOWELL/WALTER SIDAS. STEALTH PHOTO BY RICK LLINARES

BOMBIER



SPECIFICATIONS

SCALE 1/10
LIST PRICE \$340

DIMENSIONS

Length overall 14.625 in.
 Wheelbase 10.375 in.
 Width (F/R) 9.875/9.75 in.

WEIGHT (gross, RTR) 3 lb., 6.3 oz.

CHASSIS

Type Plastic "tub" w/metal F/R plates
 Material Molded composite,
 hard-anodized aluminum

DRIVE TRAIN

Type Sealed gearbox (2.4:1 reduction)
 Primary Pinion/spur gear
 Transmission Universal-joint drive shafts
 Differential(s) Adjustable ball
 Slipper clutch Adjustable friction
 Bearings/bushings Metal- /Teflon™-
 sealed bearings

SUSPENSION (F/R) Independent A-arm
 w/upper camber link
 Damping Hard-anodized/Teflon™
 -coated, oil-filled shocks

WHEELS

Type (F/R): One-piece plastic,
 fluorescent yellow

Dimensions (DxW)

—front 2.15x0.75in.
 —rear 2.175x1.375in.

TIRES

Front Pro-Line XTR-M "Edge"
 Rear Pro-Line XTR
 Pro-86 "Flat Stubbie"

ELECTRICS

Motor Not included
 Battery Not included
 ESC Not included

RC10B2 FEATURES • RC10B2 FEATURES • RC10B2 FEATURES • RC10B2 FEATURES

• **CHASSIS.** The B2 begins with a black, molded-composite chassis "tub" that has angled side pods that provide maximum ground clearance with minimum drag. The chassis' design also eliminates the need for a traditional rear bulkhead, because the rear camber-rod mounting locations and the shock-tower mount are incorporated in the rear of the main chassis.

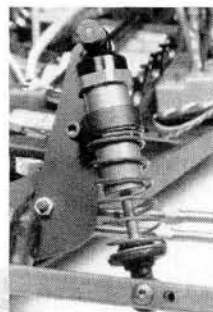
The central, strengthening chassis ribs form an effective battery-mounting "box" in which most types of 6- and 7-cell packs will fit. A unique battery hold-down brace, which hooks into a slot on the rear shock tower and is secured in front by a single body-mounting clip, allows quick battery changes and offers additional battery protection during crashes. Six-cell packs can be placed in one of three positions—front, middle or back—to adjust the car's weight bias, and this can be used as a tuning aid.

The chassis also features a neat little channel beneath the battery box; this allows the ESC-to-receiver lead to lie flush with the chassis floor and prevents the battery pack from sitting directly on the ESC lead and possibly causing it to fray. In addition, the B2's main chassis incorporates an integral antenna mount to save precious weight.

Associated also offers an optional chassis that's shorter by $\frac{1}{4}$ inch. This chassis is intended for use on very short, tight, indoor tracks, although at the time of this writing, not even Associated's team drivers have experimented with the shorter chassis.

Fans of the traditional Associated aluminum-tub chassis will be pleased to see the B2's front nose plate, which is made of hard-anodized, black aluminum. A one-piece, molded, front-suspension bulkhead is attached to the front of the nosepiece and is tied in to the main chassis by a molded, composite, upper plate. A tiny, front mini-bumper is bolted to the bottom of the bulkhead to provide a modest degree of skid protection.

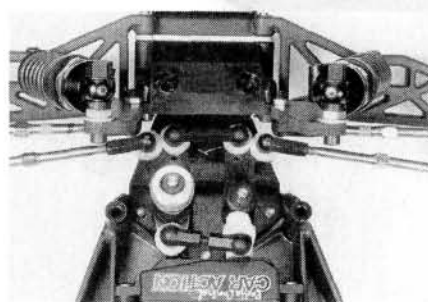
• **FRONT SUSPENSION.** To handle bumpy tracks, the B2 uses long, molded suspension arms up front. Made of a strong, nylon composite, they're attached to the one-piece front bulkhead and secured with an aluminum brace that minimizes flexing and helps to protect the bulkhead from being damaged during collisions. Standard, 30-degree Associated front uprights (caster blocks) and in-line steering arms with aluminum axles are used.



A new, $\frac{1}{8}$ -inch-thick, fiberglass shock tower shows just how much R&D went into the B2; it has only two positions for the front shocks and only one for the camber rod.

Associated is obviously very confident of the B2's suspension geometry. I used to dread having to thread the shock-mounting screws through the RC10's fiberglass

• **STEERING SYSTEM.** The B2 uses new steering bellcranks that feature a built-in, adjustable, servo-saver and a choice of two positions in which to attach the steering rods to alter the Ackerman, i.e., the relative angles of the left and right wheels when the vehicle corners. This feature allows you to adjust the steering response from mild to more aggressive.



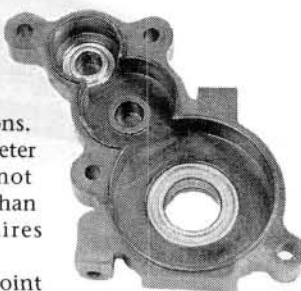
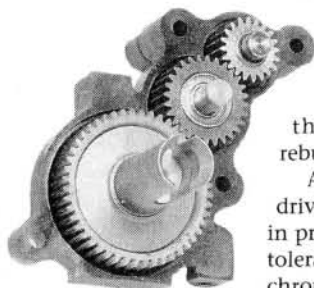
The new bellcranks pivot on plastic bushings, which can easily be replaced with bearings for smoother operation. In addition, the bellcranks feature a one-piece, molded drag link to ensure that less experienced builders achieve the correct relationship between the left and right bellcranks. Finally, a set of molded servo arms, which fit a range of popular brands of servo, is included.

• **TRANSMISSION.** The B2 uses a "second-generation" version of Associated's tried-and-true Stealth transmission. Changes to the original Stealth include a much lower, 2.4:1 reduction ratio (formerly 2.25:1), which makes it easier to gear low-turn, hot modified motors properly. The low ratio also allows the slipper clutch to be set more loosely

for better control in slippery and bumpy conditions.

Also new is a larger-diameter differential, which can not only handle more torque than the old diff, but also requires rebuilding less frequently.

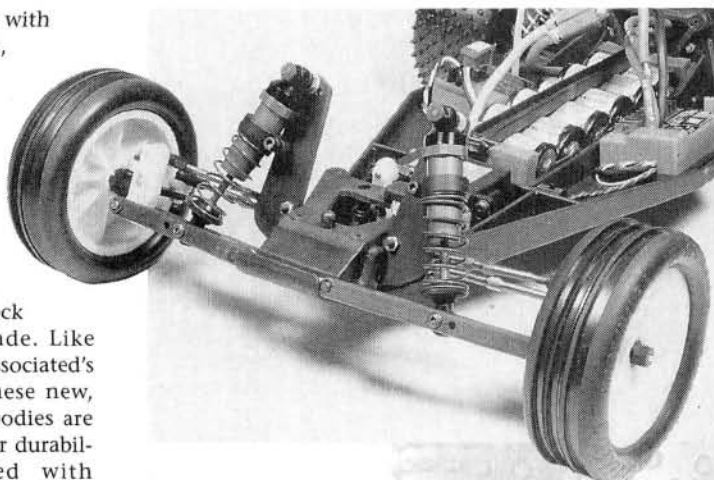
Although the B2's universal-joint drive shafts look similar to those used in previous Associated buggies, they are made to tighter tolerances to lessen wear and feature rugged, $\frac{3}{16}$ -inch-diameter chromoly stub-axes.



shock tower, but with the new tower, the holes are large enough for the screws to pass easily.

To make full use of the B2's new front-suspension geometry, new, longer, front-shock bodies were made. Like those on all of Associated's Team shocks, these new, 0.89-inch-long bodies are hard-anodized for durability and coated with Teflon™ to ensure smooth action. Used with 0.71-inch long shafts, the longer shock bodies provide more consistent damping because the shock piston never enters the air space at the top of the shock body.

Judging by the amount of flashing (excess material left over after molding) left on the old RC10's spring clamps and spring cups, you could tell that the molds

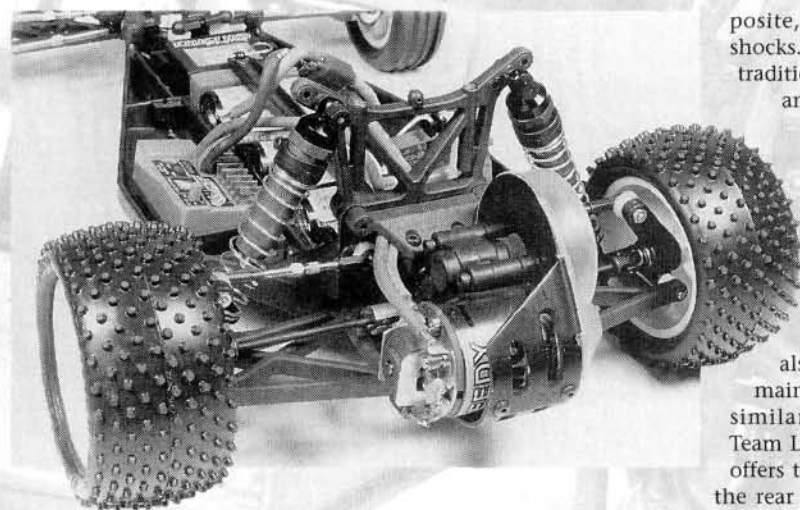


were approaching the end of their useful life. The new clamps, spring retainers and spring cups in the B2 kit are definitely of better quality (no flashing), and because the retainers are separate pieces, the right and left shock clamps are interchangeable. Also, the new spring cups make spring removal and replacement much easier.

• **BODY AND TIRES.** The B2 comes with a swoopy-looking Mirage body that gives the car an overall "low and mean" appearance. The wing is Associated's standard off-road wing, but it now comes with pre-bent wing wire (thank-you!) and dimples on the wing itself that show you where to make the mounting holes.



The kit also includes a set of Pro-Line's* Flat Stubbies rear tires (in XTR compound) and Edge front tires (in XTR as well). These tires should work well on most surfaces, so try them first before you decide to change.



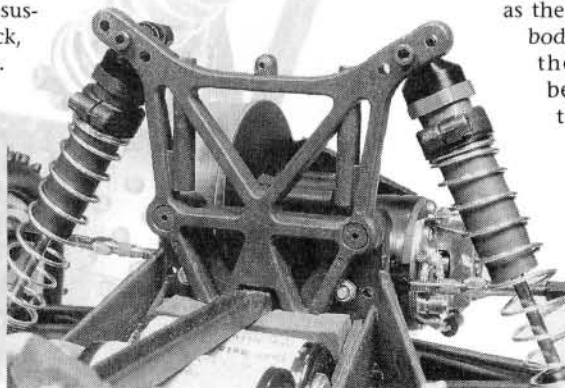
posite, and they offer two mounting positions for the rear shocks. The outer ends of the arms are attached to Associated's traditional, 0-degree toe-in, rear hub carriers, which use larger and stronger, 3/8x3/16-inch-diameter, un-flanged bearings. If you ever overtighten the wheel nuts, the included aluminum bearing spacers will prevent the bearings from binding. In keeping with the theme of "simple tuning," there's just one camber-rod mounting position on the rear hub carriers and two positions on the rear chassis bulkhead.

A molded, one-piece rear shock tower with integral wing-mounting tubes and body mount is also bolted to the rear of the main chassis. This tower is very similar to the one first seen on Team Losi's Double-X buggy, and it offers three mounting positions for the rear shocks. Speaking of shocks, the B2 uses the same combination of body and shaft



• **REAR SUSPENSION.** The B2's entire rear suspension and drive-line is attached to a black, hard-anodized, aluminum rear chassis plate. This plate was designed specially to provide maximum ground clearance; its kicked-up rear is less likely to bottom out when taking off or when landing off big jumps. Because of this, the B2 jumps farther and with greater stability than the old RC10. And because it uses separate, rear, suspension-arm mounts, the rear chassis plate allows quick and easy adjustment of rear toe-in and anti-squat.

Like the front arms, the B2's long, rear suspension arms are molded of a stiff com-



as the RC10 Worlds Car: 1.32-inch-long body with 1.02-inch-long shaft. As is the case with the front shocks, because the shock body is longer than the shock shaft, the piston remains well in the oil throughout the shock's entire range of travel.

Finally, there's a molded-composite rear-transmission brace that securely ties the transmission—and the rear-suspension area—to the main chassis. This greatly enhances the B2's entire rear structure.

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RACING THE B2

The B2's first official outing took place at the Barnstormers indoor track in Chester, NY. This track is small and tight (and really is in a barn!), and it has a huge jump on the back straight and a series of challenging "S" turns in front of the drivers' stand. The dirt's composition makes tire selection critical, because parts of the track are soft and loamy and others are hard-packed.

On this Friday night, there was only a 2WD stock class, so I bolted in my trusty Trinity Green Machine 2 motor and took a stab at guessing the hot gear ratio. Using the "standard" setup recommended in the B2's tuning supplement, I found the car responsive in the turns and an excellent jumper. During the first qualifying round, I had a little trouble getting through the hard-packed "S's"; the rear of the car kept sliding out whenever I got on the gas. For the second round, I swapped the kit's

Stubbie rear tires for a pair of Team Losi's* silver-compound 2.2 IFMAR pins (A-7367S), and this cured the problem.

When qualifying had been completed, the B2 had made it to the pole position in the A-Main. At the start of the Main, I entered the first turn a little too cautiously and found myself under a pile of cars. When the turn marshals had things sorted out, I was dead last! But the B2 came through for me, and after a couple of hot battles, I managed to work up to second, and that's how the race finished—not bad for the first time out.

The following Sunday, I took the B2 to Long Island Raceway in Farmingdale, NY. This track is one of the best indoor facilities I've ever seen. It has a huge, orange-clay-surface track at which 26-second lap times are considered quick. The challenging layout features long straight, fast sweepers, several "rhythm sections" and triple, double and tabletop jumps.

Aside from fitting the front shocks with no. 1 pistons and filling them with 30WT oil (this tends to "smooth out" the car's

steering), I left the car's setup the same.

My first time out on the Long Island track, I felt that I wasn't driving as well as the B2 was working (don't you hate it when you can't blame the car?). I crashed much more than usual, and I wasn't able to "bang" the triples consistently, so I gave the turn marshals a good workout. I changed rear tires again, this time, using Pro-Line's new XTR-M2 flat step-pins, which were perfect for the track's low-bite surface. Because the car seemed to have too much on-power steering (it was a bit difficult to get on the power coming onto the main straight), I swapped the kit's Pro-Line Edge front tires for a pair of Pro-Line's wide-ribbed tires in the harder, XTR-M compound.

During a break, my friend Carl Giordano, who was also sorting out his new B2, pointed out that I had, in fact, built my B2 using the optional steering Ackerman positions (which makes steering more aggressive) instead of the standard positions. I didn't feel like changing this at the track, so I left the setting alone.

I managed to place second in the B-Main (not too shabby, considering the

THINGS YOU'LL NEED

- 2-channel radio system
- Steering servo with at least 40 oz.-in. of torque.
- Electronic speed control (ESC).
- Six- or 7-cell battery pack (in stick- or saddle-pack format; "hump-packs" won't fit).
- 05-size electric motor.
- Suitable pinion gear.
- Battery charger.
- Basic hand tools, e.g., Phillips-head and flat-blade screwdrivers, pliers, etc.



Factory Options

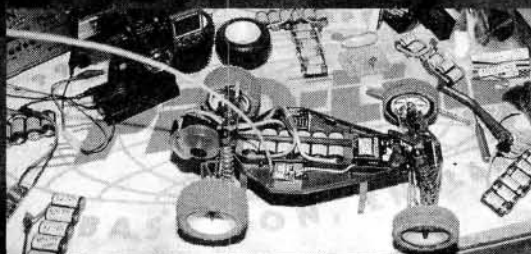
- Steering-bellcrank ball bearings—part no. 9162.
- B2 chassis, standard-length, molded, carbon-fiber composite—9199.
- B2 chassis, short, molded composite—9201.
- B2 chassis, short, molded carbon-fiber composite—9202.
- B2 battery hold-down strap, molded carbon-fiber composite—9229.
- B2 transmission brace, molded carbon-fiber composite—9381.
- B2 front arm, molded carbon-fiber composite—9106.
- B2 front top plate, molded carbon-fiber composite—9131.
- B2 front shock strut, graphite—9141.
- B2 rear A-arms, molded carbon-fiber composite—9256.
- Rear suspension mounts, 2-degrees toe-in per side—9266.
- Rear shock strut, molded carbon-fiber composite—9271.
- Shock down-stop set (travel limiters)—6466.
- B2 gear dust cover to fit Losi Hydra Drive or Schumacher* Viscous Drive—9248.

Building & Setup Tips



BUILDING TIPS

The B2 represents the latest technology from Team Associated. To date, I think this is the company's best effort as far as parts quality, ease of assembly and clarity of instructions are concerned. As with any racing car or truck, your performance on the track will greatly depend on how carefully you assemble the vehicle. Remember: fast on the workbench equals slow on the track! Here are some observations and comments I made while building the B2, followed by my initial setups.



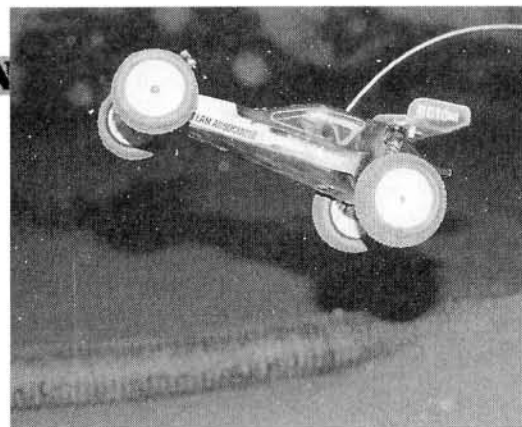
• The instructions are very good, but they seem to be most effective if you read all the text first, then study the photographs before you build anything. Don't try to build the car just by looking at the photos. It can be done, but you'll probably mess up a few small, but

important steps. Also, don't throw anything away; the manual, the little blue setup sheet and the fliers and catalogues are all handy.

- Consider investing in a good set of Allen drivers. They make threading screws and tightening setscrews much easier. Recommended wrench sizes are 0.05-, 1/16-, 5/64- and 3/32-inch. Associated, Trinity, Thorp* and Bolink* offer these wrenches.
- Use a mild thread-locking compound (such as Loctite* blue) on all the thin, plain, 4-40 nuts. These secure the tie-rod ball studs, and they've been known to shake loose.

• Before you install the aluminum axles in the steering blocks, use a sharp hobby knife to carefully bevel the edges of the holes in the axles. Doing this removes burrs and makes it easier to install the hinge pins.

• To ensure the free movement of all suspension parts, you may have to invest in a 0.126- to 0.127-inch-diameter straight reamer. If a front-suspension arm binds, ream the arm, not the bulkhead or the caster block. If a rear arm binds, ream the arm, not the arm mount or the rear hub carrier. On my kit, one steering arm bound slightly in the caster block, so I carefully ran a reamer through the upright part of the caster block.



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as his car hit the jump—a technique that provided greater jumping height and distance.

The following Sunday, the B2 and I were back in Long Island and ready for action! I ran as many rounds of practice as I could, being sure to concentrate on the triple jump. All my mental preparation worked! I successfully made the triples 95 percent of the time. The B2 felt even better this time, and it was easy to use all the Reedy Sonic

S, 12-turn double motor's horsepower.

To get the best combination of top-end speed and punch, I played with gearing. I tried everything from an 18- to a 21-tooth pinion, and I found that although the 21-tooth "smoothed" the car's throttle response and gave

the best overall straightaway speed, a 19-tooth gear provided the best "snap" out of the turns and better acceleration for taking the big jumps.

This weekend, I was more comfortable with the B2's handling, and I managed to put in a solid qualifying performance that netted me the sixth spot on the A-Main starting grid. During the Main, I was impressed by the B2's ability to be driven hard and its solidity in heavy traffic (it feels very "planted" and rarely gets knocked off course). Despite being caught in a few pileups, I finished a respectable fifth overall.

The next weekend, I was back in Long Island, and the track was even bumpier. During previous races, I had noticed that the B2 had lots of turn-in, but pushed a little in the middle of the corners. To correct this, I tried 25-degree front caster blocks instead of the kit's 30-degree blocks. The car's steering became a bit more "twitchy," but that's

TEST EQUIPMENT

Airtronics* Caliber
3Ps transmitter
Novak* NER-3FM mini receiver
Novak Tempest speed control
Futaba* S9203 servo (see note below)
Reedy Modifieds* Sonic S,
12-turn, double motor
Reedy matched Sanyo
1700mAh SCRC battery pack
Trinity* Green Machine 2 stock motor
Robinson Racing* 19-tooth pinion gear

Note: none of the B2 kit's supplied servo arms fit this servo; I cheated and forced the largest arm to fit.

driving talent at this track), and I went home to formulate a plan of attack for the following weekend's race. I changed the Ackerman to the less aggressive setting, re-installed the Edge front tires and placed one 0.031-inch-thick spacer in each shock to limit travel (doing this helps the car to corner faster and improves responsiveness). I also repeatedly visualized making the triple jump. I had watched Jeffrey Kinoo (a local racer who is sponsored by Team Losi) effortlessly make this difficult jump on every lap. Instead of trying to hit the triples at Mach 1, he let off just before the first jump, then rolled on the throttle

- While performing step 118 (attaching the front-suspension arms to the bulkhead), I had to file a tiny part of the inner arm to provide enough clearance for the aluminum arm brace. This made the arm pivot more freely.

- Pay careful attention while attaching the ball stud to the front shock tower (step 14). Be sure to use the black, low-profile ball studs, or there won't be enough clearance between the camber rod and the steering linkage.

- When installing the gasket that seals the motor-mount plate to the transmission, be sure that there will be enough clearance between the gasket and the transmission input-shaft's roll pin. If there isn't, the pin will rub on the gasket and cause drag.

- When you build the shocks, it's critical that you remove the shock-seal parts carefully from their trees using small side-cutters or a sharp hobby knife. Also, remove burrs or rough edges from the seal parts using a sharp hobby knife or a small file.

I hurried through this step, and the results were one leaking rear shock and one front shock that operated with more friction than the other. I went back and rebuilt all four shocks—this time, being sure to do it right. Now my shocks are smooth! Here's what I learned from this experience: when assembling Associated shocks, if you need to use anything more than mild pressure to get the seals installed, stop

right then and re-examine the seal parts for burrs. The seals should snap into the shock bodies with minimal effort.

- When assembling the seals, use a shock-seal lubricant such as RCPS* Green Slime. It improves the effectiveness of the seal and also reduces friction and "stiction."

- On my particular kit, the tops of my front shocks leaked oil profusely between body and cap until I used an RPM* shock wrench to tighten the cap. This isn't a big deal, but on all the other Associated shocks I've built, hand-tightening the caps was all the force needed to achieve an adequate seal. Associated has informed me that some early B2 kits may have shock caps that came from a less-than-perfect "batch," which seems to have been the case with my kit.

SETUP TIPS

At the back of the B2's manual, Associated provides a really nice setup sheet. Make lots of photocopies of this sheet and use them! I started out using the "standard" settings recommended by Associated, but I gradually found myself setting the car more toward the "optional" settings. My track has red-clay-type dirt that gets packed in the turns. There are some challenging jumps, and the surface tends to get a bit rutted.

SUPER SETUP

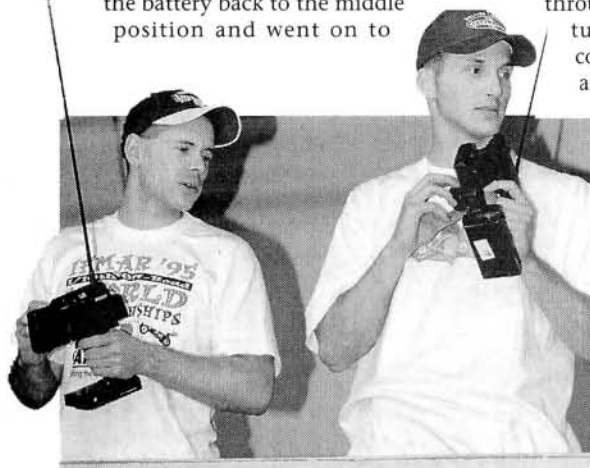
Steering Ackerman	Standard position
Bump-steer spacers	2
Motor type	12x2 large comm.
Gear ratio	19:81
Slipper setting	Medium
Rear ride height	0.875 (7/8) in.
Front ride height	0.9375 (15/16) in.
Battery type	6-cell, 1700mAh SCRC
Battery position	Middle
Rear spring pre-load	0.100 in.
Front spring pre-load	0.275 in.
Spring (F/R)	Green/Silver
Travel limiter (F/R)	0.031
Shock oil (F/R)	30WT/25WT
Shock pistons (F/R)	No. 1
Front toe-in	0 degrees
Rear toe-in	3 degrees each side (at arm mount)
Front caster angle	30 degrees
Camber (F/R)	-2 degrees
Rear hub spacer	0.125 in. (behind hub carrier)
Rear shock position (top)	Middle hole
Rear shock position (bottom)	Outer hole
Front shock position (top)	Outer hole
Front shock position (bottom)	Inner hole

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how I like my cars to handle. I could now drive the B2 through the tight, slow-speed turns without using brakes, but it had a little less turn-in during high-speed cornering and was a little less forgiving when accelerating out of corners. For most tracks and for most drivers, the 30-degree blocks will probably work best, and that's why they're listed in the "Setup Tips" instead of the 25-degree blocks.

During the first round of qualifying, I had also experimented with battery placement. I had been running with the pack in the middle position, but I had tried placing it more toward the rear of the car. I found that doing this made the car unstable over the small, sharp ruts, and it actually made the car less predictable going through bumpy corners. (Note: whenever you alter the battery's position, adjust front/rear ride height to compensate for the shift in weight).

For the second round, I switched the battery back to the middle position and went on to



post my best time to date on this track (even though the track had been much smoother during the previous weeks). I qualified in the second position for the A-Main, got knocked back to last on the third turn, then fought my way back to finish third.

After one month of testing the new RC10B2, here are my driving impressions:

- The B2 is light, and it feels so on the track. This is because there's much less scraping on the ground than with the old RC10. As a result, the new car is faster over bumps.
- Because of its rear-suspension geometry, the alignment of the tranny and rear axles and motor placement, the B2 seems to squat less during acceleration than the old car, i.e., it accelerates better.
- The B2 makes a seamless transition between turn-in and mid-turn steering. There's minimal lag between when the car slows to enter a turn (and its weight is shifted forward and toward the outside of the turn)

THE COMPETITION

	Kyosho Pro-X Team	Team Losi Double-X	Associated RC10B2	Schumacher Cougar 2000
Wheelbase	10.5 in.	10.625 in.	10.375 in.	10.75 in.
Width	9.3 in.	9.625 in. (F) 9.875 in. (R)	9.875 in. (F) 9.75 in. (R)	9.5 in.
Weight	3 lb., 8.53 oz.	3 lb., 8.5 oz.	3 lb., 6.3 oz.	3 lb., 2.26 oz.
Diff type	Adj. ball	Racing ball	Ball	Adjustable ball
Chassis	Kelron	Stiffezell	Composite /aluminum	Fiberglass /plastic
List price	\$249.99	\$339.95	\$340	\$349.50
Available at*	\$99.99	\$175.99	\$179.99	\$221.70
Reviewed in	2/95**	2/94	5/96	2/95**

*Prices vary with location;

**see 1995 2WD Buggy Guide (February issue).

and when you begin to apply throttle in the middle of the turn (and weight is shifted back to the car's rear). With some other cars I've driven, this weight shift can cause a momentary loss of traction or other types of unpredictable responses.

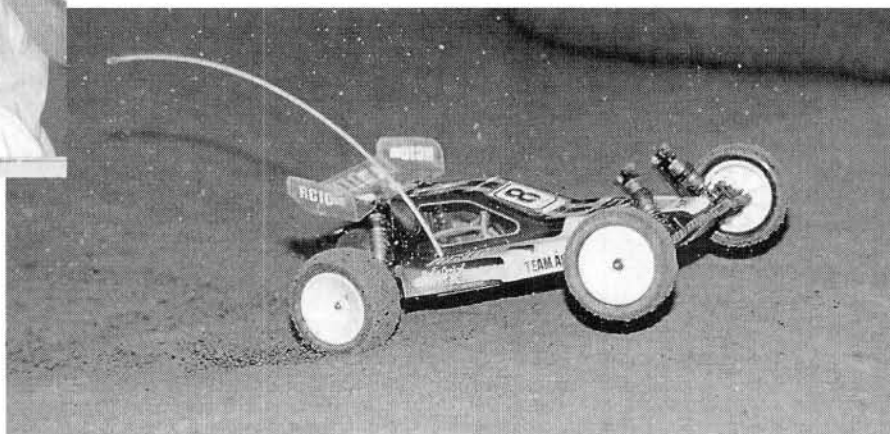
- The car carries much more speed through the turns. It makes nice round turns without squaring (unless of course, you use brakes to slide its rear around).

- The rear chassis plate's design helps to prevent the back of the car from bottoming out on the ground, so the B2 is less likely to "endo" if you come up a little short on a set of double or triple jumps. On several occasions (too

many!), I came up short on a small set of doubles, and instead of the rear chassis smacking the ground, the B2's rear suspension absorbed the force, and the car remained on its wheels.

- This car loves fast sweepers, especially if they're at the end of a long straight. The B2 lunges into the sweeper without the slightest trace of weight-transfer-induced oversteer. Its rear stays in line with the front (with confidence-inspiring ease).

- When set up correctly, the B2 exhibits remarkable poise when landing off big jumps. The Long Island track has a set of tough, triple jumps that are immediately followed by a 90-degree right turn. The B2 was excellent at clearing these triples, landing, then making the tight turn.



DOES THE B2 FLY OR BOMB?

Associated has produced a worthy successor to the RC10, and in doing so, has come up with a car that has lots of steering and can handle the bumpiest tracks. Although I found that a small (very small) degree of hand-fitting was required to provide the very best freedom of movement of the suspension pieces, overall, the quality of the parts is higher than that of any previous Associated kit.

If I had one gripe, it's that the E-clips that secure the rears of the front, inner, suspension-arm pins had a tendency to come off after a few nose-dive landings off a jump. Putting a thin washer behind each front E-clip solved this. Otherwise, the B2 performed flawlessly throughout the test period.

Call me nostalgic, but I miss the old RC10 a little; but whenever I drive this new car, memories of gold-anodized aluminum and white nylon suspension arms become more distant.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.



SPECIFICATIONS

SCALE 1/10
LIST PRICE \$288 (\$298 with body)

DIMENSIONS

Length overall 13.5 in.
 Wheelbase 10 in.
 Width (F/R)* 7.81 in./8 in.

WEIGHT (gross, RTR) 3 lb., 5 oz.

CHASSIS

Type Flat plate with upper deck
 Material Black fiberglass

DRIVE TRAIN

Type Sealed gearbox/belt-driven 4WD
 Primary Pinion/spur gear
 Transmission Universal-type drive shafts
 Differential(s) Ball diffs
 Slipper clutch Yes
 Bearings/bushings Metal bushing

SUSPENSION (F/R)

Type Independent, lower control arm/upper link
 Damping Coil spring

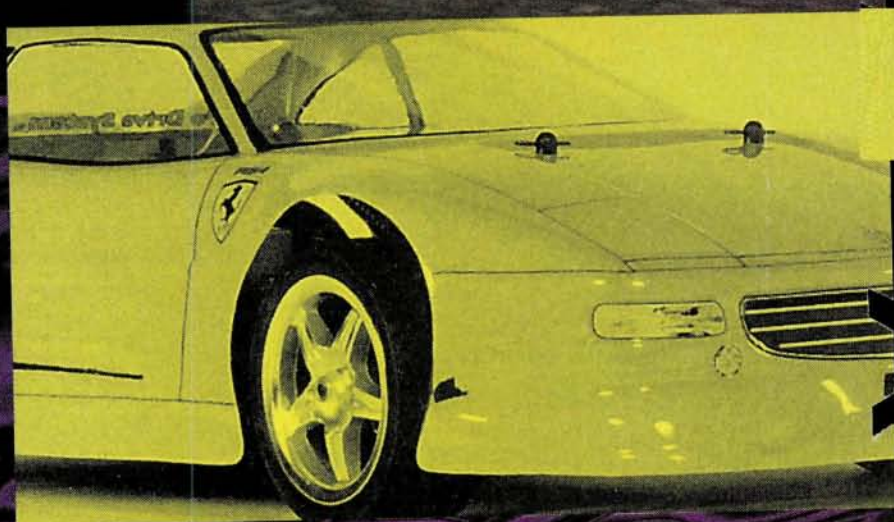
WHEELS (F/R)

Type One-piece molded mesh
 Dimensions (DxW) 2x1 in./ 2 x1.25 in.

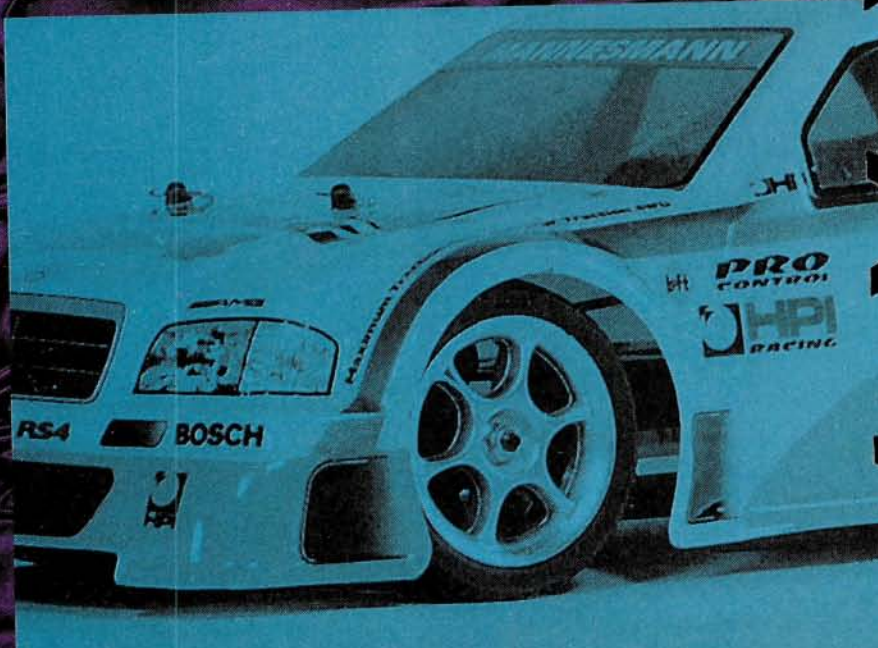
TIRES (F/R) M-compound Super Radials
 *Wide version measured

THINGS YOU'LL NEED

- 2-channel radio
- ESC
- Steering servo
- Motor
- Paint for Lexan body
- Charger
- Battery pack



THE NEXT GENERATION



HPI RS4

by JOHN HOWELL

ONE OF THE current rages in R/C is touring-car racing. It's also a segment of the hobby that has experienced quite a bit of growth lately—especially in the “high-end” arena. Quite a few companies are making full-blown racing-type touring cars. After Tamiya* had piqued everyone's interest in the class with the introduction of their Nissan Skyline based on the TA01/Manta Ray chassis), other companies started to take the class seriously—and to another level. Yokomo* was the first, with the release of their YR-4—the first touring car that was showcased as a serious racing machine. Soon, companies such as Kyosho, Schumacher, Tamiya and Tenth Technology retaliated with their own versions of a “high-end” racing car. Still, with all that was available, the YR-4 remained the choice of many hardcore parking-lot racers. That was, until now; enter the HPI* RS4.

If you've been living in a cave and haven't noticed, HPI has been making some excellent parking-lot racing cars and accessories. Their graphite monocoque F1 chassis is a work of art, their Super F1 car kit is just that—super, and their newest parking-lot endeavor, the RS4, is sure to turn a few racers' heads. And let me tell

you, I've driven quite a few touring cars recently, and I have to say that this car has me hyped up. Interested? Well then, let's kneel down on the asphalt and take a look under the hood.

KIT FEATURES

The HPI RS4 is one of the most high-tech-looking touring cars available; it just screams “speed.” The backbone of the RS4 is a double-deck fiberglass chassis. When fully assembled, the RS4 has an extremely rigid yet lightweight chassis setup. A unique battery box fits batteries midship across the chassis, and it can be placed more toward the front or the rear of the car depending on which screw holes in the chassis you use. I set mine up with the battery box placed at the front for more steering.

Attached to the chassis are upper and lower nylon suspension arms. The lower arms are made of fiber-filled nylon composite, and the upper arms are made of natural nylon composite that's a little softer and will be more forgiving if you bang into something that's a little harder than you would have liked—say, a curb.

Hard-anodized aluminum shocks (some of the smoothest and easiest I've ever built)

Factory Options

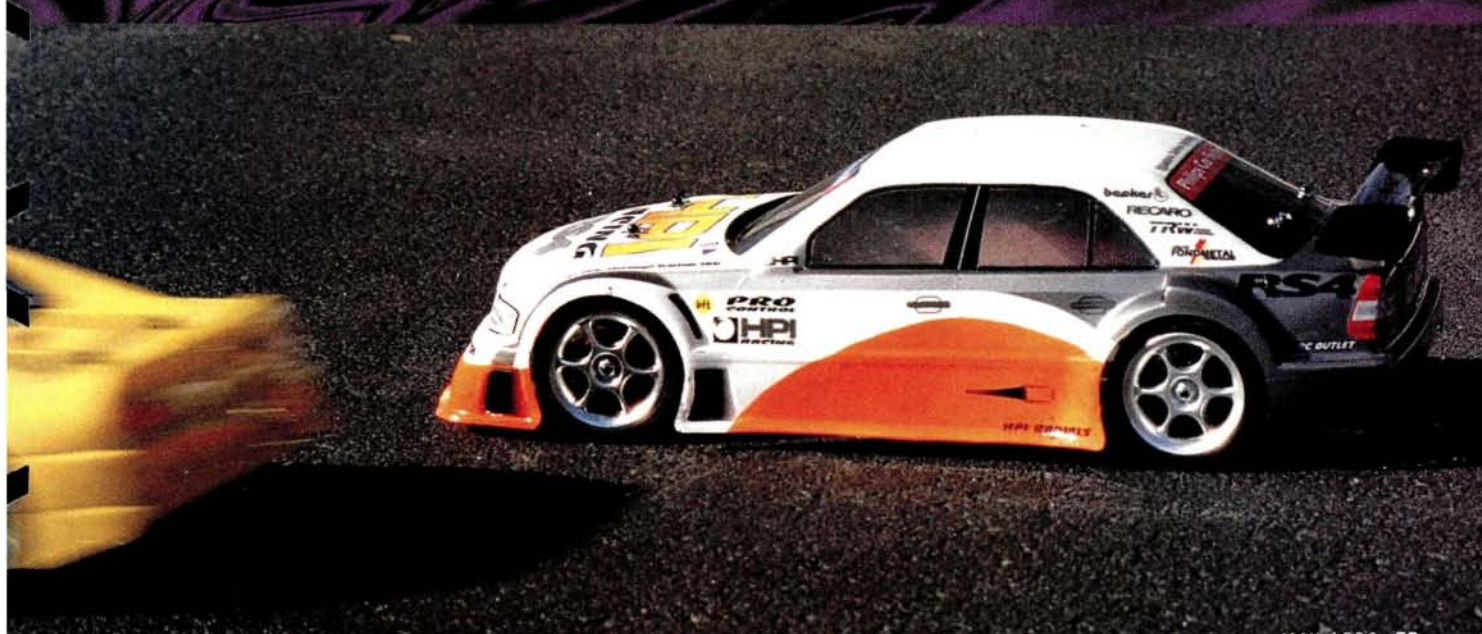


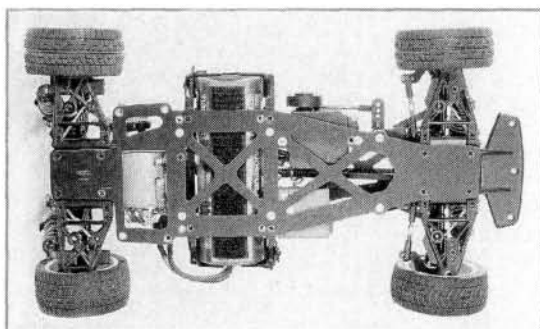
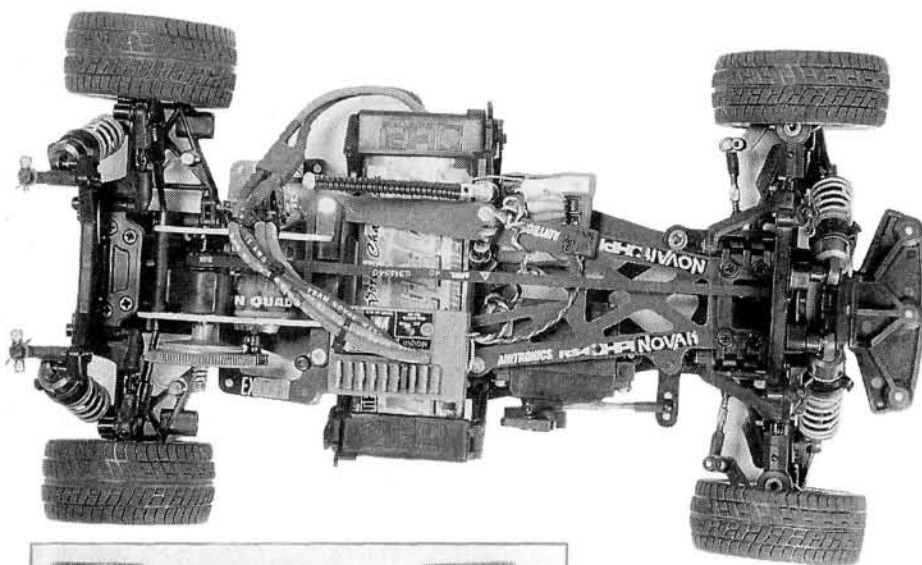
In stock form, the RS4 is a potent performer. If, however, you want to turn your stocker into a screamer, here are a few goodies you might want to check out.

- Graphite main chassis—part no. A231
- Graphite upper deck—A234
- Graphite gearbox plate—A252
- Graphite nerf wing (standard RS4)—A206
- Graphite nerf wing (wide RS4)—A216
- Graphite rear shock mount—A218
- Motor plate with cooling fins—A246
- Sway bar set (standard RS4)—A209
- Sway bar set (wide RS4)—A210
- 14-tooth one-way pulley—A254
- 15-tooth one-way pulley—A255
- Stainless hinge pin set (10)—A260
- Front one-way diff set—A505
- 5x8 ball-bearings for diffs (2)—B020
- Ball bearing set (20)—B040
- 2mm carbide balls (thrust bearing) (6)—A156
- 2.4mm carbide balls (diff) (12)—A157
- Low-profile Super Radials (2)—4520
- Super Radials (2)—5130
- Wide Super Radials (2)—4511
- 116-tooth spur gear (64-pitch)—6716
- Spring 1.4mm (white)—6833
- Spring 1.45mm (yellow)—6834
- Spring 1.5mm (red)—6835
- Spring 1.6mm (green)—6837
- Spring 1.65mm (blue)—6838
- Spring 1.7mm (purple)—6839

are attached to the lower suspension arm and to the top of the front molded bulkhead/gear case. In both the arm and the bulkhead, there are two mounting holes from which to choose. HPI also includes plenty of pistons in the kit, so you can tune

RATION OF TOURING CAR





From this view, (top) the car may look complex, but don't be fooled; it's actually very easy to build and tune. From underneath, (left) you can see that sections have been cut out of the chassis to help reduce weight. When the top of the double-deck chassis has been added, the chassis is extremely rigid.

your shocks to different track conditions.

A belt-drive system helps get the power to all four wheels. Externally adjustable ball diffs are found both front and rear. In the rear of the car, a three-gear, sealed gearbox is reminiscent of those found on off-road buggies and trucks. There is a part

in the rear gearbox that can be switched around to alter the overall gear ratio from a 2.1:1 to a 2.6:1 final drive ratio, and that would allow you to run slightly larger tires. Hmm...slightly larger tires? Well, let's just say that, at this time, HPI neither confirms nor denies the rumor that the car has the



LIKES

- Highly tunable.
- Extremely easy to build.
- Good factory support.
- Plenty of hop-ups available.



DISLIKES

- None come to mind.

potential to attack other types of track. We'll just have to let you think about that one for a while.

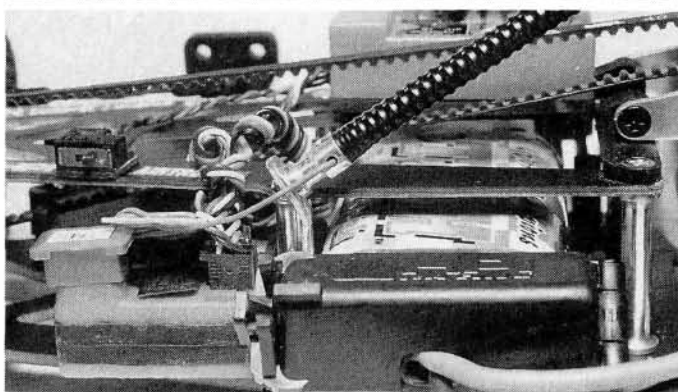
I was impressed that a slipper clutch comes standard with the RS4. Other touring cars offer a slipper clutch as an option, but for now, the RS4 is the only one on the market that has it as a standard feature.

On the downside, the car is equipped with bushings, not bearings! Blasphemy you say? Initially, I thought the same thing. How could a car that's going after the hardcore racing market come with bushings instead of bearings? Well, HPI informed me that they included the bushings to keep the cost of the kit down, and that's always a good thing in my book. Even with the kit's original bushings, the car has been winning some pretty big parking-lot races out in California! If it can win out there against such fierce competition, I wouldn't worry too much about the bushings. For those of you who want the bearings to help smooth out the car's driveline, they're available through HPI as optional hop-up parts. (Check out the accompanying list of factory options to see all the trick goodies that are available.)

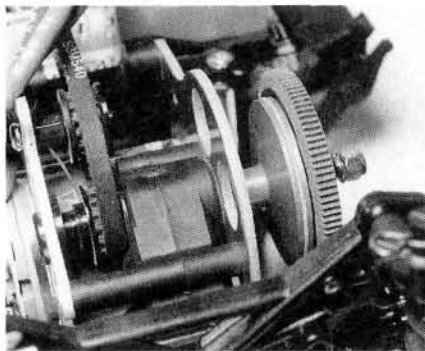
One of the most interesting features of the RS4 is that its width is totally adjustable. Whether you want to set up your car in wide or standard width, it's totally up to you. All you have to do is alter the length of the upper and lower suspension arms as well as the drive shafts. To make the standard-width car, you must cut off part of the upper and lower suspension arms. If you want the car wide, just bolt the pieces on as they come in the kit. If you make the standard version, but later you want to convert it to the wide setting, you'll have to buy some new parts, because you'll have cut the stock pieces to modify them. If you plan to race the car, find out what the rules are about how wide it can be. The difference between the two settings is very interesting. I've heard people comment that it's like owning two different

THE COMPETITION

	Tamiya TA02RS	Yokomo YR-4SPORTS	HPI RS4	Kyosho TF-2
Wheelbase	10.88 in.	10.25 in.	10 in.	10.28 in.
Width (F/R)	8.65 in./9 in.	7.13 in.	7.81 in./8 in.	7.81 in./7.75 in.
Weight	3 lb., 5 oz.	3 lb., 3 oz.	3 lb., 5 oz.	3 lb., 7.5 oz.
Diff type	Gear (f)/Ball (r)	Ball	Ball	Bevel gear
Chassis	Plastic	Black fiberglass	Black fiberglass	Aluminum
List price	\$320	\$190	\$288 (\$298 w/body)	\$199.99
Available at	\$192.99	\$120	\$194.99 (\$199.99 w/body)	\$149.99
Reviewed in	TK	TK	5/96	1/96



To give the car a cleaner, sleeker look, I added a Kose inboard antenna. It helps you achieve that "scale look" without having a large antenna tube sticking out of the top of the body.



A slipper clutch comes standard on the RS4—a really nice touch! It helps fine-tune the car on slippery track surfaces.

cars. If you can race the wide setup, try that first; it's more stable.

With their kits, HPI includes trick-looking wheels (different bodies come with different style wheels) and M-compound Super Radial tires (wide in the rear and narrow in the front). So far, the bodies that are available are a Mercedes-Benz, a Ferrari F355, a Porsche 911 Turbo, a McLaren GTR and an Acura NSX. They all look pretty stylin'!

TEST GEAR

When you have a racecar of the RS4's caliber, you don't skimp on your running gear. Here's what I used to set up my car.

- Trinity* EX-Tech Panasonic 1800Z battery pack;
- Trinity Speed Gems Jade 15-turn Quad modified motor;
- Novak* Tempest Pro ESC;
- Novak NER-3FM 75mHz receiver;
- Hitec* 605BB steering servo;
- Airtronics* Caliber 3Ps radio.

PERFORMANCE

I loaded up my RS4 and took it to an empty concrete parking garage to see how it would run. I took along a few different shock springs, shock spacers, pistons, shock



Notice the difference between the standard suspension arm and the wide suspension arm. Only the wide version (left) is included with the kit. To make the standard-width version of the car, cut or file off part of the suspension arm (right). If you want to alternate between standard and wide, you'll have to buy another set of upper and lower suspension arms.

Building & Setup Tips



The RS4 is one of the easiest cars I've ever built. If you want the car to run in top shape, there are a few areas to which you need to pay special attention.

- If you get the bushing-equipped kit, use a rag or a Dremel machine to polish each bushing with metal polish. This will help eliminate some drag, and the drive train will roll a little smoother.
- If you run the narrow setup, be careful when you cut the suspension arms. If you cut off too much, you'll soon have to buy a new set of upper and lower suspension arms.

• Before you bolt anything to the chassis, run a bead of thin CA around the edges of the upper and lower chassis plates to help prevent them from fraying.

• Whenever you remove a plastic piece from one of the parts trees, make sure you remove all excess flashing. This is especially important when you remove the shock pistons (step 1, page 4). If there is any flashing left on the piston, it could create excess drag between the piston and the inside of the shock body. Carefully smooth out the edge of the piston with an emery board or a smooth piece of sandpaper.

• So that you don't damage the shaft when you thread on the ball cup during shock assembly (step 1, page 4), heed HPI's advice and protect the shock shaft with masking tape or something else. If you scratch the shaft, you could damage the O-rings inside the shock body. Also, don't forget to put a drop of oil on the threaded tip of the shock shaft before you put it through the shock body. Failure to do so could result in a torn O-ring.

• Be careful when you assemble the three gear pulleys (step 2, page 5). Each pulley has a guide that has to be CA'd into place. It's a tricky step, and if you glop on too much CA, the pulley gear will be out of form, and it won't spin well once the belt is in place. Use an extension tip for your bottle of CA so that you'll use only a drop or two. If you have never seen this tip, they're available at most hobby shops. It's a piece of plastic that you place over the tip of your CA bottle to limit the amount of glue that comes out.

• When building the diff, there are two things that need to be lubed—the diff balls and the thrust-bearing assembly. There are two types of grease included with the kit (one container has a red cap and one has a white cap), and the diff balls and the thrust bearing use different types of lube. Pay attention to which one calls for which lube.

• After you have assembled the rear gearbox and are ready to attach the rear gear pulley (step 3, page 6), you'll notice a small boxed-off part in the instruction manual that tells you to cut or sand off part of the pulley. You don't need to do any cutting. I had to sand just a hair off the end of it to make it fit.

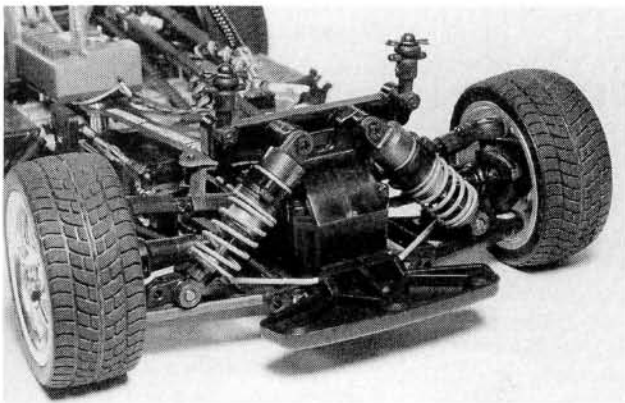
• When you assemble the drive shafts (step 4, page 7), the instruction manual calls for you to put some thread-lock on the screw. Use blue Loctite or something similar. If you ever want to take them apart, don't use red. (If you switch the car from the wide to the narrow setup, or vice versa, you'll have to take the drive shafts apart to alter their lengths).

• Be careful when you snap the aluminum balls into the front suspension arms (step 4, page 7 and step 9, page 12). The balls have to be totally smooth to work properly. HPI recommends that you use two pieces of Lexan (one on top of the ball, one on the bottom of the suspension arm) when you press the ball in with a pair of pliers. The first one I pressed in taught me a lesson. I used only one piece of Lexan (the one on top of the ball), and when I pressed the ball in, it smacked into the bottom of the pliers and was scraped up a bit. Needless to say, I used the two pieces of Lexan after that.

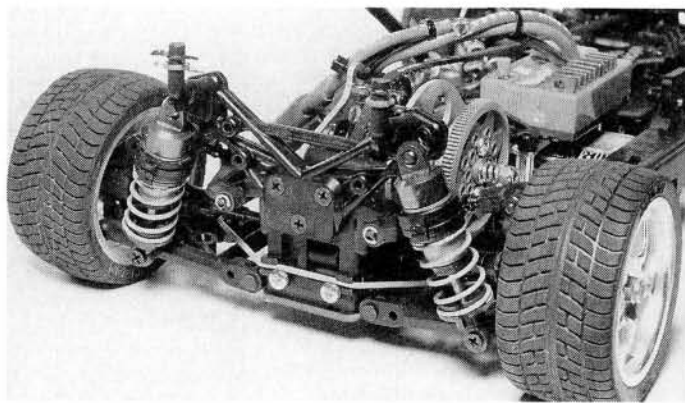
The HPI car is versatile, and every kit includes setup tips direct from HPI. If you need an idea of how to set up your car for a specific application, look no further than that sheet. Here's how I set up my car:

- HPI full ball-bearing kit;
- HPI sway-bar kit (for wide car);
- Front shocks—Tamiya red shock springs, Trinity 15WT silicone oil, no. 1 pistons;
- Rear shocks—Tamiya blue shock springs, Trinity 15WT silicone oil, no. 2 pistons;
- Suspension arms level (both front and rear);
- Torque limiter set at 60 amps.





Up front, hard-anodized aluminum shocks handle the damping. I replaced the stock springs with red Tamiya springs, filled the shocks with Trinity 15WT silicone oil and used no. 1 pistons. I also tested one of HPI's optional front sway bars.



In the rear, the same hard-anodized aluminum shocks handle the damping. I replaced the rear stock springs with a set of blue Tamiya springs. I filled the shocks with Trinity 15WT silicone oil, and I used no. 2 pistons. I added an optional HPI rear sway bar to complement the front sway-bar unit.

oils of various weights and associate editor George Gonzalez (he was also dying to see it run). After setting up an impromptu road-course, George and I took turns messing with the car on the slick concrete surface, running pack after pack.

I tested the car with one of HPI's Ferrari F355 bodies. I painted it bright yellow with Pactra paint (hey, every Ferrari is red. Why not break away from the pack?). One thing we noticed while running it was that the body is a little flimsy in the front, and at speed, it flexes and scrapes a bit on the concrete. I pulled the car back into the "pit," and we placed a rubber O-ring on each of the body posts to raise the front. That solved the problem. While we were doing that, we noticed that, for the front of the body, we could easily make a Lexan brace that would help stiffen it considerably. I'll have to test the idea out to see whether it works.

Performance-wise, this thing really smokes! It's one of the most stable cars I've ever driven. I felt as if I was driving a slot car. Whenever I turned the wheel on my 3Ps, the car eagerly responded and went where I wanted it to go—even on a somewhat slippery surface. The car's braking ability really impressed me, too. Obviously, the Novak Tempest Pro helped out in that department. But, it wasn't just the stopping power that impressed me; it was also the car's straight-line stopping ability. The second I slammed back on the trigger, the RS4 stopped, and it never wavered from side to

side. Every time I locked up the brakes, George and I were thoroughly impressed.

After we had run it a while (with the combination of the Tempest Pro, the Trinity Panasonic pack and the Jade 15-turn quad, we actually had more run time than we expected), we began to experiment with the slipper clutch. When we first ran the car, we would punch the throttle, and all four wheels would spin off the line. When we put the car through a wide,

it would straighten itself out and speed off down the straightaway. It was absolutely wild, and George and I had a great time. This showed me what a valuable tuning aid the slipper clutch is—especially on slick surfaces.

When we ran out of batteries, we packed up and headed home to set the car up for another test session at a different location. The whole ride home, we "bench raced" the RS4 and argued back and forth about who pulled off the better controlled slides through the sweeper. Obviously, we were hooked!

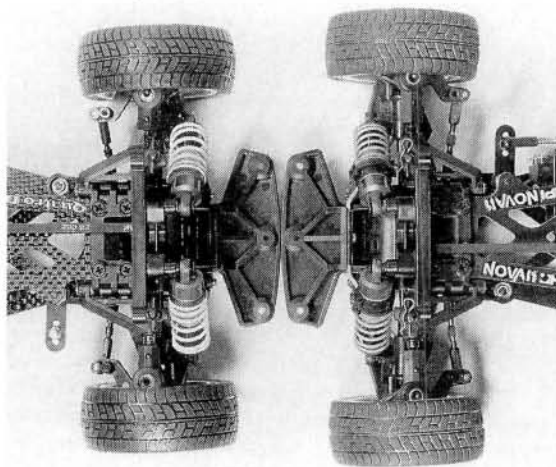
FINAL THOUGHTS

So, what do I think about the RS4? I love it! Before it came out, I was hooked on the YR-4 (geez, there are a whole lotta 4s going around); I thought no other car could come close to its performance. Well, after running my RS4, I can honestly say that I prefer it to the YR-4. In all fairness to Yokomo, though, I have yet to drive their all-new YR-4M. Will that be the king of the touring cars, or will the RS4 reign supreme in my mind?

Here's another variable to throw into the equation: we just got one of Kyosho's new high-end TF-2s. How does that stack up against these cars? It sounds as if we're going to have to get all of them together on the same track pretty soon to find out which touring car is top dog! Stay tuned for that.

In closing, if you're looking for a highly competitive touring car that has the potential to win a lot of races, check out the RS4. You won't be disappointed!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.



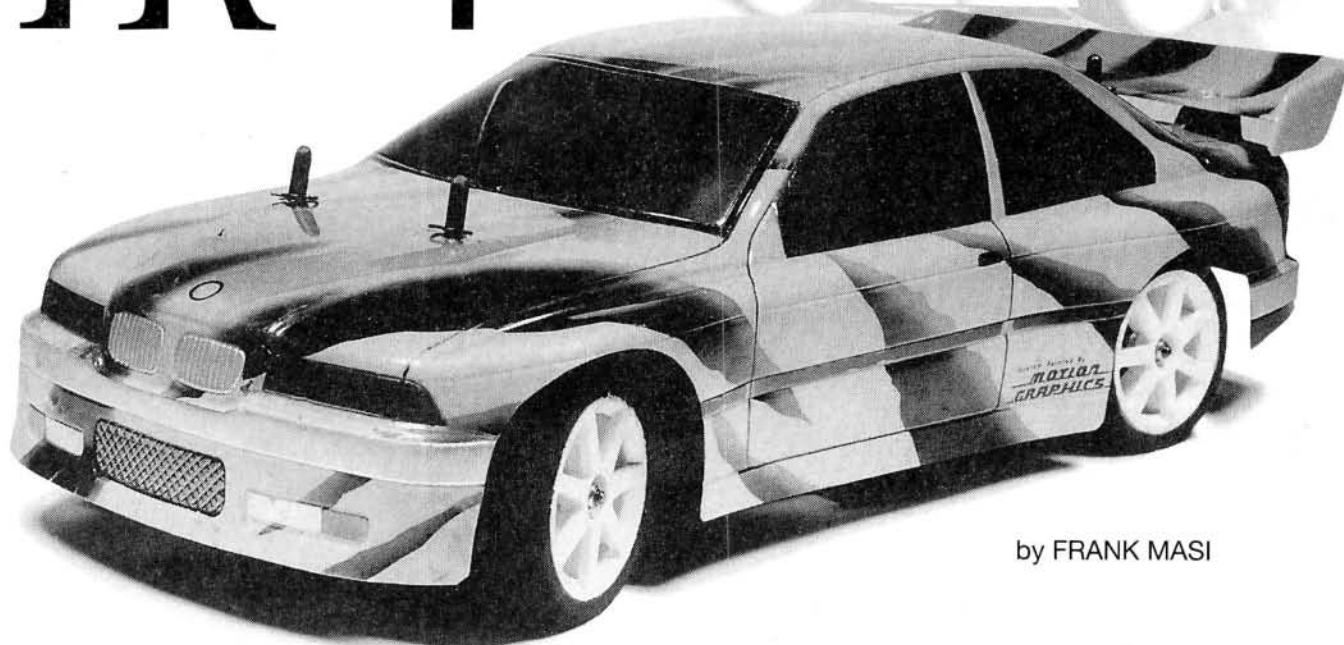
Notice the difference between the standard-width car (left) and the wide version (right). I've heard that the wide version is the car that is being raced most successfully on the West Coast. The added stability makes it easy to drive fast!

sweeping turn with the power on (prior to setting up for a long straightaway), the car tried to spin out. We loosened up the slipper and tried it again, and we were able to put the same amount of throttle into the turn without the car's spinning out. Most of the time, the car would do this wild, controlled slide as all four wheels clawed their way through the apex of the turn, and then

Tuning and modifying the

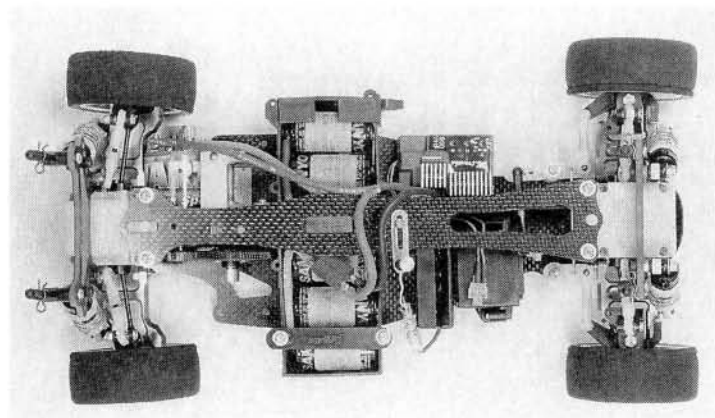
YOKOMO

YR-4



by FRANK MASI

When we first reviewed the Yokomo* YR-4 (back in August '94), we found its simple 4WD belt-drive system efficient and durable, and its handling established its position among the élite in the then-new, narrow touring-car class. Since then, this racing class has seen the introduction of several new designs, e.g., the HPI* RS4 and Kyosho* TF-2, that have proven to be more than adequate challengers for the YR-4—so much so that I felt that it was time to trick out my Yoke.



Yokomo's graphite chassis set provides a stiffer "backbone" for the venerable YR-4. There isn't much room for the electronics, so careful placement is essential.

- The basic YR-4 kit uses a fiberglass chassis plate, upper plate and shock towers. These pieces work well, but graphite parts are both lighter and more rigid. I swapped the stock pieces for a graphite chassis and upper plate set from Yokomo. This chassis set actually comes with graphite, replacement shock towers for the front and rear, but having learned that Factory Works* offers replacement shock towers for the YR-4 as well, I opted for them because of their additional shock- and camber-rod-mounting holes, which the Yokomo pieces don't have.

- I next replaced the large, stock, Kydex front bumper with a much smaller unit from Factory Works. Granted, the original bumper provided much more crash protection, but I figure that I'm a pretty careful driver.

While my YR-4 was disassembled for this project, I decided to reduce its weight further by drilling holes in the battery box. This only reduces weight slightly, but it also improves battery cooling and gives my car that "factory" look.

• Many owners have complained that the Yokomo's rear-transmission design is notorious for trapping small pebbles that can destroy the rear diff pulley. To alleviate this problem, I cut a small notch out of the back of the rear bulkhead to allow the debris to exit. A Dremel tool or similar rotary grinder works well for this.

Soon after doing this, I learned that Kose* offers trick, lightweight, blue-anodized aluminum bulkheads for the YR-4's front and rear. These bulkheads are open at their ends, so dirt and debris can easily be ejected. The Kose front bulkhead is designed to allow the front bumper to be mounted on the top of the chassis instead of to its underside. Because I was using the mini-bumper, which is mounted on the chassis' underside, I had to place aluminum spacers between the chassis and the front of the bulkhead where the stock bumper would normally go.

• The YR-4's drive train needs little improvement. In addition to adding a full

PARTS LIST

YOKOMO

- Graphite chassis—part no. ZR-GS
- Titanium screw set—ZR-030
- Ball-bearing set
- Slick tires

FACTORY WORKS

- 1/8 in. thick front shock tower—2030
- 1/8 in. thick rear shock tower—2031
- Thin front bumper—6191
- Hex wheel adapters—6190

MIP

- CVD drive shafts for YR-4—1106

KOSE

- 8-degree lightweight, aluminum front bulkhead—K-1811
- Lightweight, aluminum rear bulkhead—K-1810
- Aluminum arm sets—K-1807B (front), K-1808B (rear)
- F1 on-board antenna set

TRINITY

- Speed Gems Quartz, 19-turn double-wind motor—9207
- Sport-Tech 6-cell 1800 Panasonic Z pack—EXSZ76A

HOBBY PRODUCTS INTL.

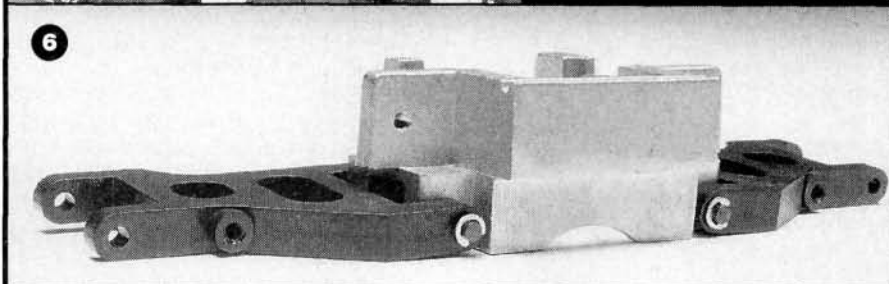
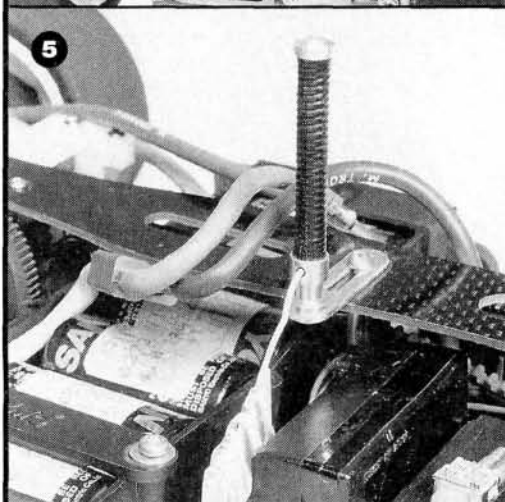
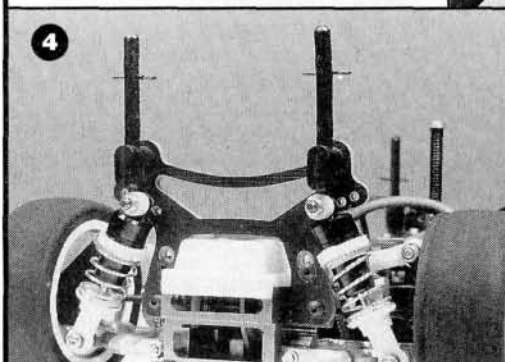
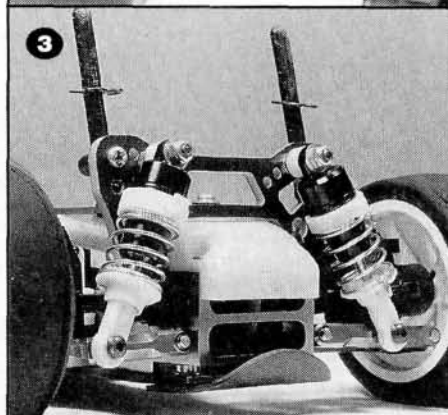
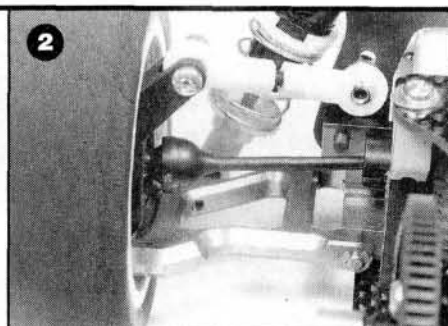
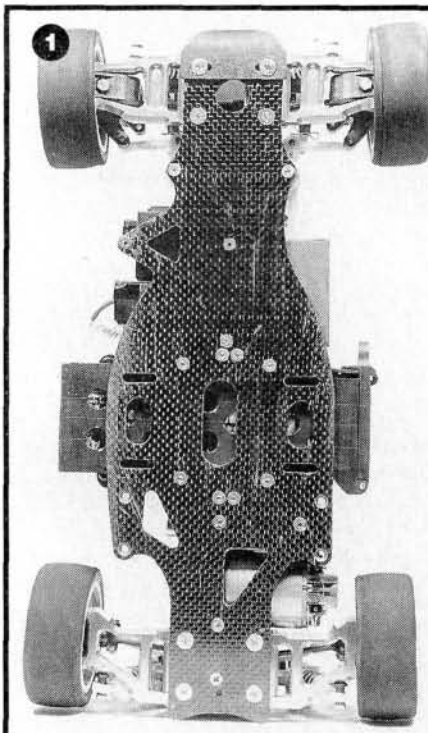
- Wide treaded tires—4511
- Carbon-fiber wheels

HITEC/RCD

- High-speed servo—HS-525BB

FREWER

- BMW GTR body set

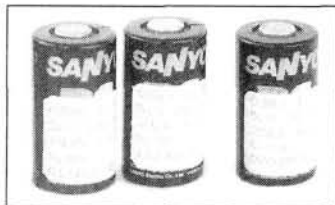


1. The beautiful, blue aluminum Kose suspension arms make the suspension much more rigid, and this proved to be a hindrance on a very bumpy track such as ours. As you can see, the chassis scraped the ground more than once! 2. As far as smoothness goes, MIP's trick new YR-4 CVD drive shafts are a step above the kit's dogbone-style shafts. 3. Up front: a Factory Works replacement shock tower and front mini-bumper; a Kose aluminum bulkhead and suspension arms. Note the additional mounting holes on the new shock tower. 4. The Factory Works shock towers provide additional shock- and camber-rod mounting positions for more tuning options. The Kose rear bulkhead's open design prevents debris from building up and damaging the diff pulley. 5. The on-board Kose antenna works well and preserves the clean, realistic look of the touring-car body. To fit the chassis, the KO-Propo receiver had to be tilted onto its side. 6. A small notch ground into the bottom of the stock rear bulkhead allows debris to exit the diff area without damaging the diff pulley.

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YR-4

set of high-quality, Yokomo, rubber-sealed ball bearings, I reduced belt drag by replacing the belt guides' bronze bushings with small, flanged ball bearings. I then added a full set of MIP's* new CVD drive shafts made specifically for the YR-4. These shafts operate with less binding than the stock, universal-joint shafts—a difference that isn't too noticeable on the rear of this road car, but it's helpful up front because they provide smoother steering with less binding under acceleration.

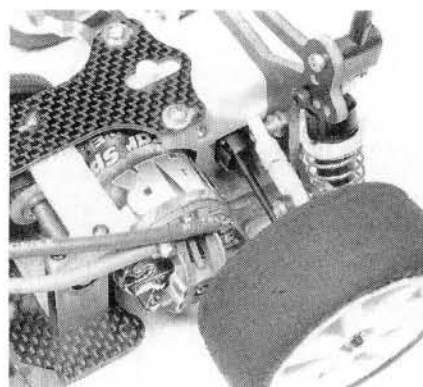
• While fitting the YR-4 with new bulkheads, I decided to add a full set of Kose, blue-anodized aluminum suspension arms, which are virtually flex-free and match the blue bulkheads beautifully. One thing I learned about suspension arms on this project: if you race on a bumpy, paved surface, you'll probably find that the stock, molded-nylon suspension arms actually provide better handling. On our bumpy track, my YR-4 was noticeably faster *before* I added the more rigid, aluminum arms. On a smooth surface, however, I bet that the aluminum arms will be better because they help to maintain proper suspension geometry.

• For traction, I ran both the kit's molded wheels with the included, Yokomo, rubber slick tires and a set of HPI carbon-fiber wheels with that company's wide, treaded tires. The HPI wheels were designed for Tamiya and Kyosho vehicles, and I attached them to my YR-4 by using a set of Factory Works hex-wheel adapters.

Similar to my experience with the suspension arms, I found that the more flexible Yokomo wheels provided better handling on bumpy tracks, while the HPI wheels were more consistent on smooth surfaces because they were less flexible.

• On our track, motors in the 15- to 20-turn range provide the best compromise between straight-line speed and out-of-the-corner punch. Coinciding with this project, Trinity* released its newest Speed Gem motor—the Quartz. Like other Speed Gems, it's a machine-wound modified that provides almost as much power as a hand-wound modified for quite a bit less moolah. The Quartz is a 19-turn, double wind that's perfect for touring cars, and it also features ball bearings and adjustable timing, so its endbell can be removed for easy cleaning and rebuilding.

• I chose the new Hitec* HS-525BB high-speed servo to handle the steering. It produces 47oz.-in. of torque (enough for a monster truck!) at a very brisk 0.16-second transit time—for sure, enough power to keep my YR-4 tracking straight. Mtroniks* sent me one of their new, ultra-high-frequency, 900VHF Turbo speed controls, to which I soldered a set of Deans* Ultra Plugs battery connectors. If attached correctly,



Trinity's new Speed Gems Quartz 19-turn, double-wind, modified motor. This power-plant is ideal for tight and twisty parking-lot tracks, and it's listed at less than \$50. As you can see, we race till our tires fall off!

these connectors are actually as efficient as the wire itself. I soldered the male half of the connector to the ESC and the female half to a Trinity, Panasonic, 1800SCR-Z Sport-Tech battery pack. The additional capacity of the new Panasonic cells makes these packs ideal for extended parking-lot running.

• The KO-Propo* KR-291F receiver from my EX-1 radio system fit snugly between the steering servo and battery box, although I had to turn the receiver onto its side to make it fit. To preserve the sleek lines of the Frewer* BMW GTR body (which, incidentally, was painted by the master himself, Richard Muise of Motion Graphics*), I installed a Kose onboard antenna.

PERFORMANCE

In stock form, the narrow-chassis YR-4's handling is paramount (although I haven't driven HPI's RS-4 yet), and it can definitely keep pace with slightly wider chassis such as the Kyosho TF-2.

Admittedly, I attacked this project by amassing all the hop-up parts I could find to bolt on to my YR-4 chassis; some boosted performance on our bumpy track and some hindered it. Generally, I found that the stock, flexible arms combined with the slick tires (which allowed the car to slide through the turns) yielded the fastest lap times. When I made the suspension as rigid as possible (by adding aluminum arms) and bolted on "grippy" tires, the car tended to chatter through the turns and was more susceptible to traction rolling. Apparently, narrow cars work best when they're allowed to slide in the turns.

For smooth tracks, I recommend a stiffer chassis and suspension; but for bumpy tracks, you'll have to experiment as I did to achieve the best balance of handling and durability.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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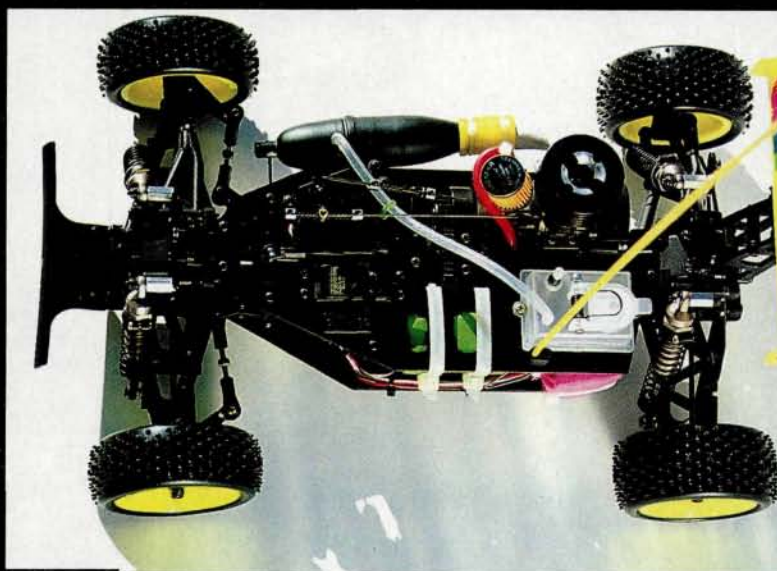
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A PRO-LEVEL GASSER FOR BEGINNERS

by George M. Gonzalez



The chassis is well-designed and the suspension is extra-beefy and will handle any terrain. The Thunder Tiger Pro 12BZX pull-start engine comes as standard equipment, as do ball bearings, turnbuckles, anodized shocks and a nylon wing.

THUNDER TIGER Challenger Pro

THUNDER TIGER USA* has recently entered one of the most demanding segments of the R/C industry—nitro-powered off-road. I was one of the privileged few who tested their first 1/10-scale 4WD offering—the Challenger Pro. As its name indicates, the Challenger Pro was designed for serious racing, but its price tag suggests something altogether different. At around \$280—engine included—it's priced to attract first-time gassers.

I've been involved with R/C racing for many years, and I've concluded that nitro-powered racing isn't for everyone. I have discovered, however, that the racers who are involved with this racing class are among the most loyal, and they swear that no other racing class can match the excitement that the nitro class provides. So, those of you who are looking to break into the exciting world of gas racing but don't want to mortgage your house in the process should read on, because this might be the car for you.

KIT FEATURES

The Challenger Pro includes many of the features you would expect from a pro-level car: a full set of bearings; three supersmooth bevel-gear differentials; alu-

minum shocks with interchangeable pistons; front universal swing shafts; adjustable tie rods; an effective disk-brake system; a cool-looking, single-seat, racing-buggy body with a molded wing; and aggressive racing tires with foam inserts. In addition, the buggy includes a black-anodized, stamped-aluminum, double-deck chassis, a powerful Thunder Tiger

Pro-12BZX pull-start engine with header and tuned pipe and a 75cc quick-fill fuel tank. But wait; there's more! The Challenger Pro comes 90 percent assembled, and that means you'll be out catching some air sooner than you think.

The Challenger Pro's drive train is similar to that of most 1/8-scale nitro-powered off-road buggies, but it has been downsized to fit under a smaller body shell. The three bevel-gear differentials are of excellent quality, and the internal gears are all interchangeable; this makes buying replacement gears less confusing and also means you'll have fewer spare parts to stock. The engine's clutch bell is mated with the center diff via a plastic spur gear, and dogbones transfer the power from the center diff to the front and rear diffs; this is a race-proven method, and it works very well on the Challenger Pro.

The racers who are involved with this racing class are among the most loyal, and they swear that no other racing class can match the excitement that the nitro class provides.

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$399.99

DIMENSIONS

Length (overall) 17 1/4 in.
Wheelbase 10 7/8 in.
Width (F/R) 10 1/4 in.

WEIGHT (gross, RTR) 4 lb., 4 oz.

CHASSIS

Type Stamped plate with upper deck
Material Aluminum

DRIVE TRAIN

Type Shaft-driven 4WD
Primary Clutch bell/spur gear
Transmission Front universal shafts/rear dogbones
Differential(s) 3 bevel-gear differentials
Bearings/bushings 16 ball bearings

SUSPENSION (F/R)

Type 4W independent w/lower suspension arms and upper adjustable links
Damping Aluminum, oil-filled, coil-over shocks

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW)
—front 2.2x1.25 in.
—rear 2.2x1.50 in.
Tires (F/R) Mini-pin spike/X-pattern

POWERPLANT

Engine Thunder Tiger .12 Pro BZX with pull-starter
Pipe Thunder Tiger tuned pipe
Carburetor Thunder Tiger barrel

It's winter out here on the East Coast, so there isn't much dry ground on which to run a gas-powered car such as the Challenger Pro. To properly judge the car's performance, I sent it out to California correspondent and gas racer A.R. Flatbush.

During the two-tank break-in runs, excitement grew with every tweak of the carb to leaner settings. I've been playing with my Kyosho Inferno 10 for almost two years; I've upgraded it with aluminum shocks, stiffer springs, torsion bars, full bearings, ball diffs, ball-bearing steering, chassis stiffeners and carbon-fiber brakes, and I added travel to the front. It's pretty frustrating to have undertaken all those modifications and development, only to have this car come along and, in my opinion, outperform my I-10!

The spring rates are stiff enough for rough tracks, and the shocks perform amazingly well (I used Associated 20WT silicone oil with one-hole pistons). Thanks to its rigid, dual-deck chassis, the Challenger Pro is much more stable on the rough stuff, and it also has more front suspension travel than the Inferno 10. In fact, it performs better than my fully tweaked Inferno 10 at everything except cornering. The Challenger Pro doesn't have much steering lock, so it has a wide turning radius (about 50 scale feet), although the excellent brakes help bend the buggy around the tightest turns. There's not much to snivel about with this car.

It starts easily, handles very well, and it has strong suspension arms and excellent control linkages, although for stronger braking and quicker throttle response, I replaced two linkage springs with sections of fuel tubing. I also noticed a rather high center of gravity, so I attached the servos and fuel tank to the underside of the top chassis plate. These mods helped considerably, and the best part is that they didn't cost an arm and a leg.

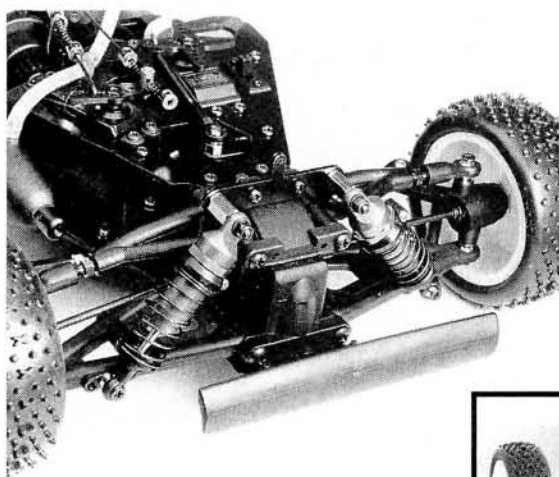
—A.R. Flatbush

CHALLENGER PRO

The aluminum upper deck houses the steering and throttle servos, receiver and receiver battery pack and a quick-fill, 75cc fuel tank. For improved handling, all the components are well-balanced on the upper deck, and the entire assembly can be easily removed for routine cleaning and maintenance. Also, the throttle/brake servo is mounted at an angle that's suitable for connecting the throttle and brake linkages.

TEST GEAR

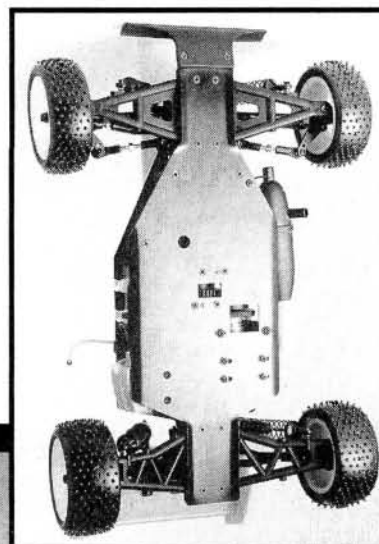
Once again, I trusted my faithful Airtronics* Caliber 3P to send the commands to the Challenger Pro. A Novak* NER-3FM picks up the signals and sends them to a pair of new Futaba* servos. For the steering, I used an S9402 servo, which provides an amazing 111 oz.-in. of torque and a lightning-fast 0.10 sec/60° response time—truly the best of both worlds. The throttle and brake chores are handled by an economically priced S3003 servo, and



Left: the front end is all business. The upper and lower arms are very rugged and should withstand the rigors of nitro-powered off-road racing. The high-quality aluminum shocks are mounted on a rigid, aluminum shock tower. Check out the front universal swing shafts; they're standard equipment. Below: this flip-side view shows the stamped-aluminum chassis. Check out the raised sides and the counter-sunk screw holes—very nice.

THINGS YOU'LL NEED

- 2-channel radio with two servos (one for steering; one for throttle).
- 12 AA batteries (eight for transmitter; four to power receiver and servos).
- Glow igniter.
- Fuel (15 percent nitro to start).
- Paint for Lexan body.



Building & Setup Tips

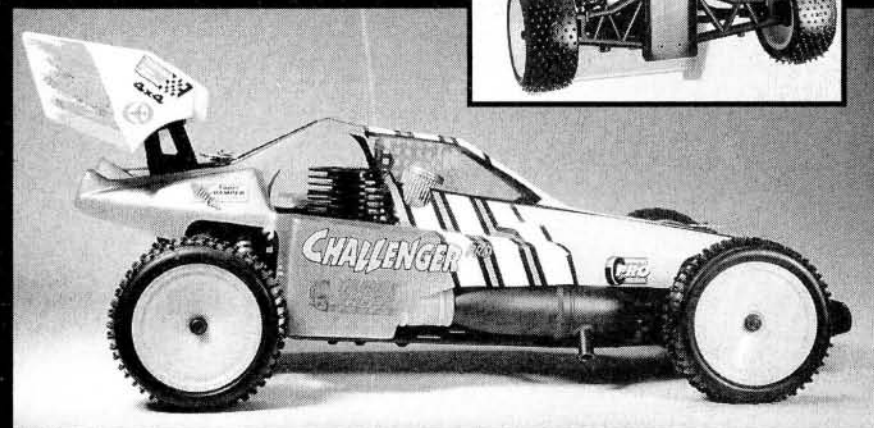


From the moment you open the box, you'll notice that the Challenger Pro is 90 percent assembled. All three diffs, the pull-start engine and the 75cc fuel tank have been bolted onto the chassis. Thunder Tiger even went to the trouble of assembling the entire suspension for you (shocks and all). All you'll have to do is install the front universal swing shafts and rear dogbones and mount the suspension arms on the bulkheads with the supplied hinge pins. You'll also have to hook up the throttle and brake linkages, glue the tires onto the wheels, prepare the body for painting and install your radio gear.

Even though the Challenger Pro is almost ready to go, I do have a few tips.

- Before you do anything, follow the three-page supplemental instructions, then refer to the instruction manual.
- You can hook up the throttle/brake linkage with the carburetor throttle arm facing the outside or the inside of the chassis. It comes facing the outside of the chassis, and the instructions direct you to keep it in that position, but the photo on the box shows it facing the inside of the chassis.

Both ways work well, but I like the throttle arm facing the inside of the chassis, because then, the needle valve will be more accessible. It's very easy to turn the carburetor around; just carefully loosen the 1/4-inch nut on the neck of the carburetor, and rotate the carb 180 degrees. If your radio gear doesn't have a servo-reversing function, it's nice to know you can hook up the linkage either way to accom-



modate your radio system.

- When you mount the body, you have to cut an opening for engine-head and tuned-pipe clearance. Oddly, there's no mention of this in the instructions. This opening is extremely important because to perform properly, the engine needs cool air running through the heat-sink head.

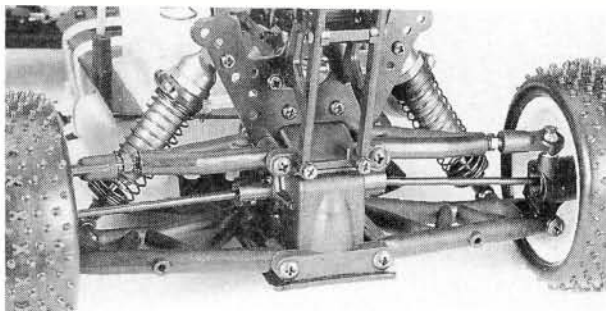
I also ran into clearance problems when I installed the receiver in the provided location; no matter how I mounted the body, it rubbed against the receiver. I could have cut an opening in the body to allow some clearance, but that would have looked pretty cheesy. My only other option was to install it on the main chassis on its side next to the fuel tank—not the ideal location, but I wrapped it inside the included balloon to protect it from fuel spills.

- The front suspension had an enormous amount of bump-steer. I remedied this by installing a few shims under the pillow balls on the bellcrank arms as well as under the pil-

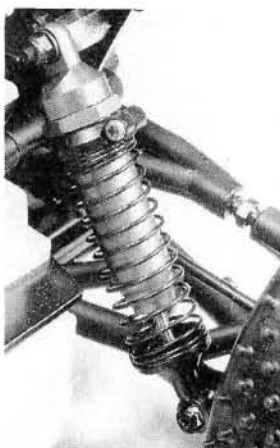
low balls on the steering blocks.

- You might want to limit the suspension travel on the rear shocks by installing Associated* or Losi* shock limiters on the shock shafts inside the shock body; the rear shocks had way too much down-travel, which caused the rear dogbones to bind a little.
- For smoother operation and longer gear life, I applied a little molybdenum grease—available at any auto-parts store—to the bevel gears.
- I highly recommend that you loosen every screw that makes contact with metal and place a drop of high-quality thread-lock on it; nothing rattles a chassis more than a high-revving glow engine.
- Break in the engine according to the manufacturer's suggestions; the instructions are well-written.

If you spend a little extra time tweaking and doing some preventive maintenance on your Challenger Pro, you'll be rewarded with hours of trouble-free fun.



Above: the rear end is equally impressive. Notice the extra-long upper and lower suspension arms with adjustable camber, the high-capacity aluminum shocks, the beefy aluminum shock tower and the high-grip tires—all standard! Right: now, these are bouncers! Anodized-aluminum, double O-rings, rubber diaphragms, soft springs; what else could you want?

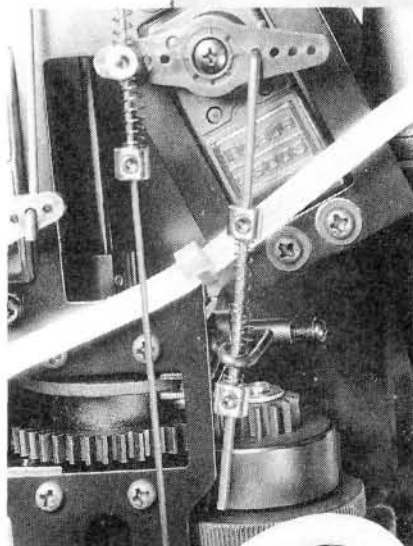
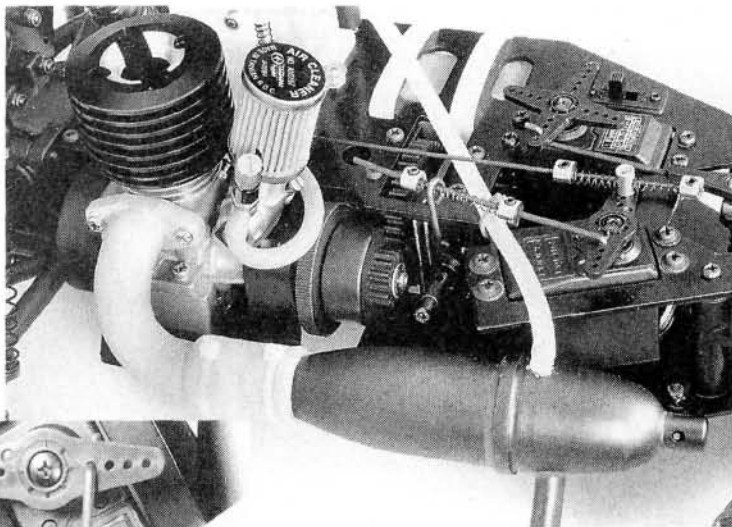


THE COMPETITION

	OFNA* Pirate 10	Kyosho* Inferno 10	Thunder Tiger Challenger Pro
Wheelbase	10.75 in.	10.75 in.	10.875 in.
Width	9.75 in.	(f) 9.25 in./ (r) 9.5 in.	10.25 in.
Weight	3.2 lb.	3 lb., 12 oz.	4 lb., 4 oz.
Diff type	Bevel gear	Miter gear	Bevel gear
Brakes	Disk	Disk	Disk
Exhaust	Header and pipe	Header and pipe	Header and pipe
Price	\$349.99	\$499.99	\$399.99
Available at**	\$279.49	\$339.99	\$279.99
Issue reviewed	11/94	4/94	5/96

**Prices may vary with location; all prices include engine.

The powerful Thunder Tiger Pro-12BZX, header, tuned pipe and air filter are all standard equipment. Ain't life grand?



The centrally mounted, nylon-composite disk brake provides plenty of stopping power. The brake-shoe tension can be easily adjusted by tightening a couple of screws. I might make a carbon-fiber brake disk, which will make this buggy stop on a dime. The budget-priced Futaba S3003 throttle servo works great.

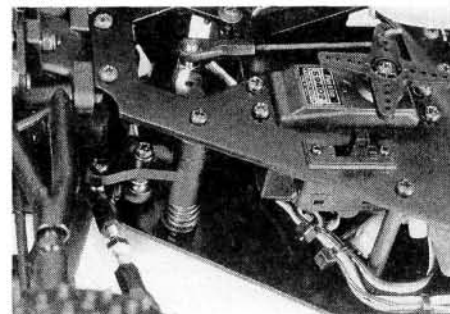


- Low price.
- 90 percent assembled.
- Ball bearings included.
- Engine, header and tuned pipe included.
- Excellent shocks.
- Extra-beefy adjustable turnbuckles.
- High-traction mini-spike tires with foam inserts.
- Tough, molded wing.
- Aluminum wheel hubs that will accept Kyosho wheels.
- Giant teardown blueprint included, and the instructions are very well done.



DISLIKES

- Engine mounts do not accommodate non-pull-start engines (unless you break out the Dremel).
- The body fits so tightly that you have to mount the receiver in an awkward location (attached to the fuel tank).
- I had to fuss around with the steering linkages to get the correct geometry.



An extremely smooth steering bellcrank with built-in servo-saver provides ultra-smooth steering; and if the buggy does a flip-flop, you won't damage your servo. To get rid of unwanted bump-steer, I shimmed up the steering-rod ends. Check out the mighty Futaba S9402 servo—high-speed and high-torque; you gotta love it.

all the electronics are powered by a BRP Model Racing Products* 5-cell AA battery pack. I also used a Thunder Tiger glow-plug igniter and Blue Thunder* 15-percent nitro fuel.

FINAL THOUGHTS

The Thunder Tiger Challenger Pro is the perfect car for breaking into the exciting world of nitro power. It's economically priced, yet it comes with an impressive list of high-performance features that are options on cars that cost considerably more. With a little tweaking and adjusting, this buggy can hold its own on any track. So, what are you waiting for? Put a tiger in your tank, and soon you'll be clawing your way through the competition.

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.

Secrets of Smooth Shocks

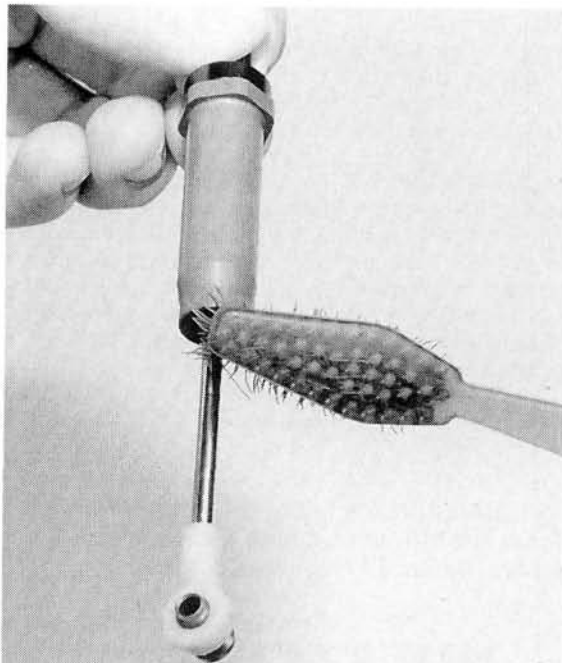
by JACK JOHNSON

Easy tips for
consistent
damping

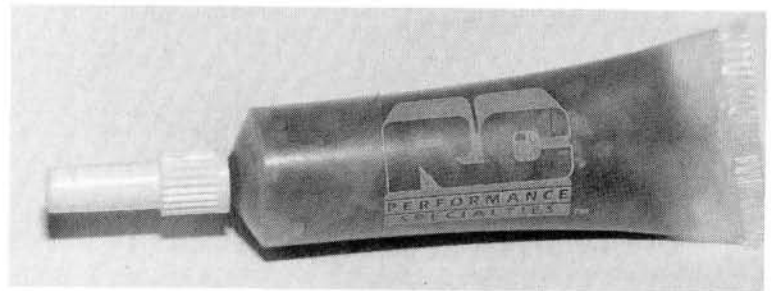


YOU MEAN I have to take my shocks *apart*?! As sad as it may sound, all shocks need to be maintained. This includes periodic cleaning, refills, oil changes and sometimes complete rebuilds. How long a shock will last and how long you should wait between rebuilds depends on the surface on which you drive your vehicle as well as the roughness of the track or area on which you drive your car or truck.

If you drive on a dusty surface that has a lot of loose dirt on it,



An old toothbrush is great for cleaning dirt away from the area where the shaft enters the shock body.



"Green Slime" works extremely well on O-rings in the shocks. It reduces drag and improves the seal.

you'll clean and rebuild your shocks more frequently than if you drive on a hard-packed surface. If you drive on an extremely rough surface, the oil will need to be changed even more frequently, and shock rebuilds will be required regularly.

Like most R/C components that require maintenance, shocks tend to scare most first-time mechanics away; the thought of all that shock fluid and mess makes most of us cringe. But maintaining and working on shocks is actually pretty simple. Let's get down to the basics.

HOW DID MY OIL GET SO DIRTY?

Even though shocks have seals that keep the oil in, fine dust and sand particles can still build up and pass through the seals into the oil; if you've ever taken your shock apart and wondered why the oil has turned a murky-looking color, that's why.

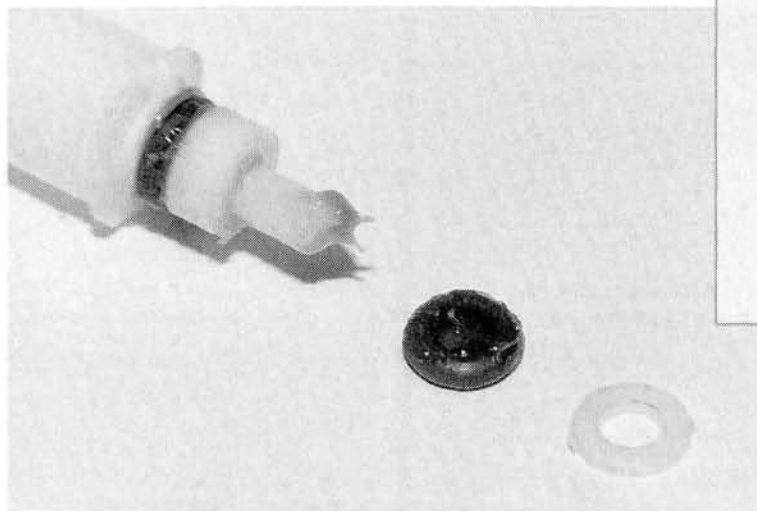
Some racers blame this discol-

oration on the anodizing coming off the inside of the shock. Although anodizing *can* mix with the oil (usually on less expensive, aluminum-bodied shocks and rarely on hard-anodized shocks), dirt is almost always the cause. If the shock fluid appears discolored, it should be replaced. Dirty fluid can considerably reduce the life of your seals and shafts.

To extend the life of your seals and shafts, clean the bottom of the shock seal with an old toothbrush after every run. This will decrease the amount of dirt that passes through the seal into the shock fluid and reduce scratching and surface wear on the shock shaft.

IT FEELS AS IF THERE'S AIR IN MY SHOCKS

If a shock feels as if it has air in it when you compress it slowly, add shock fluid. When the shock becomes low on fluid, flush and replace the fluid instead of just top-



Apply a fairly heavy coat of grease to the O-rings (or seals). After assembly, wipe off any extra grease.

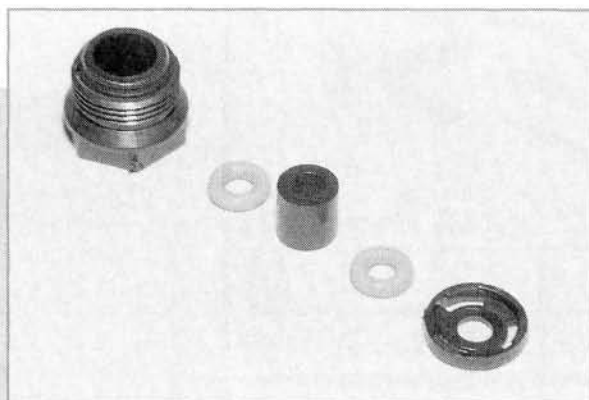
ping it off. This is important because shock fluid actually "breaks down" after it has been used for a while; it will function as if its weight (viscosity) has been changed, especially if you run on a rough surface and the shocks move more than usual.

Running on a very bumpy surface can also make the shocks look as if they're leaking more because, when a shock is working fast, i.e., moving through most of its travel range for a length of time, it produces heat. When the shock fluid

becomes heated, it "expands" but has no place to go except past the seal. Despite this, the shock still has sufficient oil, but after it cools down and the fluid "contracts," there will be air inside the shock. So, if your track is really rough, keep an eye on your shocks.

MY SHOCKS HAVE A RUNNY NOSE...

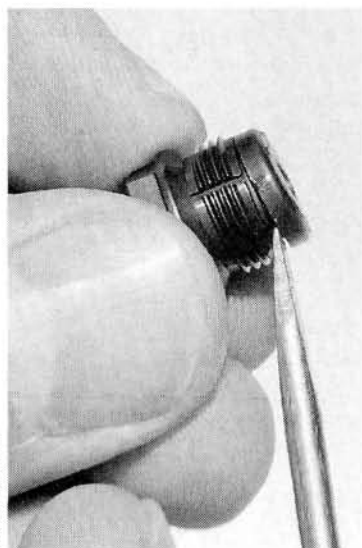
OK; you keep adding fluid to the shocks, and it keeps leaking out; looks like it's time for a rebuild. It's



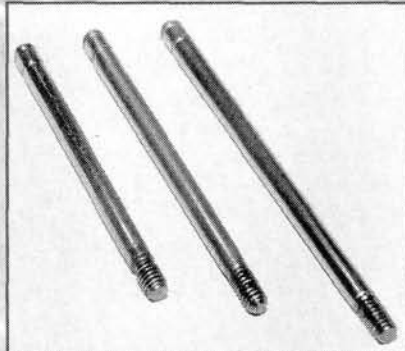
To apply grease to the seals in these Losi cartridges, first take the cartridge apart and remove the seals. Be careful when you remove the O-rings; don't damage them.

not that bad, I promise. I'll even show you a cool trick that will make the seals last longer and work better, too. Get yourself a shock-rebuild kit or new cartridges and some rags. Then take the shocks off your vehicle, and let's get to it.

Remove the shock cartridge (Losi and Schumacher shocks) from the shaft, or remove the shock shaft and the complete shock seal assembly (O-rings, spacers, etc.). Disassemble all four shocks, and use a motor spray and an old rag to clean the remaining fluid out of the shock body. Inspect the shafts for scratches and wear. The shock shafts should have a shiny finish. If they're scratched and dull, they



Use a small screwdriver to pry the cap off a Losi cartridge. Don't stretch or damage the cap, because it will have to be re-installed after you've greased the seals.



Team Losi and MIP offer titanium-nitride-coated shock shafts. This ultra-hard, ultra-smooth coating helps the shock last longer between rebuilds.

expensive machining tools. A coated shaft will outlast an uncoated shaft several times over.

At first, these cool-looking shock shafts might scare you away because they're slightly more expensive than standard shock shafts. But remember the old saying, "You get what you pay for"; it definitely applies here! These shafts are as good as gold. They will last just about forever, and in the long run, they're worth the cost.

Better Shock Shafts

Shock shafts can take quite a beating. They're exposed to dirt, and they constantly move into and out of the shock seals at an incredible speed. They can become scratched and just plain worn out!

To address this, several companies offer specially coated aftermarket shock shafts that provide smoother operation and longer life. Team Losi* and MIP* offer gold, titanium-nitride-coated shock shafts. Team Associated* has just released "Unobtanium" shafts, which are coated with gun-metal blue titanium carbonitride. The surface of these shafts is nearly impossible to scratch. These types of coating are commonly used on

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ESP Stock

EL930 - Epic Black Magic Lay-down 24Degree with silver hole-shot brushes. Dyno Tuned \$24.95
EL930T - As above with diamond trued comm. Wizard's Choice \$34.95

Other 24 and 36 Degree motors are available using Epic, New Nexxus and New Vortex designs.

ESP Modified Motors

Custom handwound modified motors using the latest in EPIC, YOKOMO, NEXXUS and VORTEX teardowns. All motors are handwound, epoxied, and dynamically balanced on the latest equipment. All motors are priced at \$41.95 or in quantity of 3 or more \$39.95

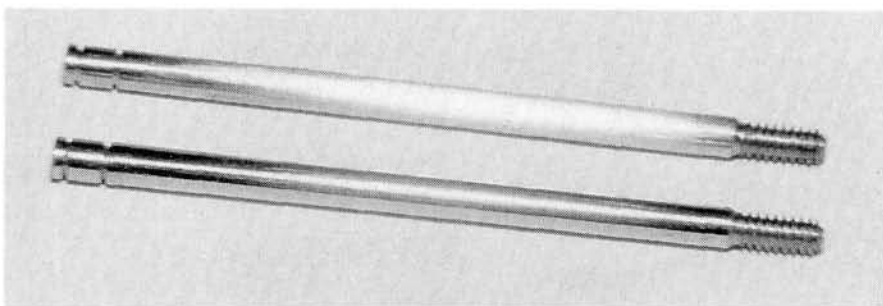
Armatures \$18.95

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Columbus, OH

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WWW - We have web pages on the internet! ESP is presently setting up our own server so please use Yahoo to locate our site!

SMOOTH SHOCKS



Once a shock shaft becomes dull and scratched like the one on the top, it should be replaced. Continuing to use a damaged shock shaft will only scratch and tear new O-rings

should either be polished or replaced. As far as performance is concerned, replacing the shafts is the best way to go. Polishing the shafts can slightly reduce their diameter, and that can affect the quality of the seal. If you try to polish the shafts, use crocus cloth—an ultra-fine polishing-type sandpaper sold at most hardware stores.

Now for the trick I promised you. Before you install new shock seals, grease them with a Teflon™ shock-seal lubricant. RCPS* makes a grease called Green Slime that works great. If you can't find Green Slime at your local hobby shop, go to a motorcycle shop and ask for fork-seal grease. If you're building Losi shocks, hang on, I'll tell you what to do in a minute. Assemble the shock seal according to the instructions (or, if you have no instructions, in the order in which you took the old parts out), and apply a heavy coat of grease to the O-rings and spacers. Don't worry if it looks like too much; after the shaft has been installed, you can wipe off the excess. The grease will let the shaft slide past the O-rings with less drag, and it will improve the seal and reduce leakage. After the shock-seal assembly has been greased and installed, insert the shock shaft, and reassemble the rest of the shock. Then wipe off the excess grease.

If you rebuild a shock that uses a car-

tridge, you'll have to first take the cartridge apart. Carefully pry the cap off the cartridge with a small screwdriver. Be careful not to stretch out the cap because you'll have to re-install it shortly. Remove the O-rings and spacers from the cartridge, and be careful not to cut or tear them. Grease the O-rings and spacers liberally, and reassemble the cartridge by installing one O-ring, then the spacer, then the second O-ring. Make sure the parts are all the way into the cartridge body, and snap the cap into place. Slide the cartridge over the shock shaft, and wipe off the excess grease. Fill and bleed the shock as you usually would.

After this rebuild, the shocks will probably leak slightly more than usual for the first few runs. Don't panic! This is to be expected when grease is used on the seals. Once the grease "seats" around the O-rings, the leaking will stop; the seals should last much longer than a seal that has not been greased. Remember to clean dirt and oil away from the shock seal with an old toothbrush after each run. After about three runs, the shocks will have been topped off with fluid again, the grease will have been "seated," and the shock seals should stop leaking.

THAT'S IT!

See! Now, that wasn't so bad, was it? As long as you change the shock fluid occasionally and clean the dirt away from the shock seal area, your rebuilt shocks should last for quite a while. If this is the first time you've rebuilt your shocks, congratulations! Now you can go tell your friends how to do it and impress them with your knowledge. Unless, of course, you want to go out and run circles around them at the track for a while. Then maybe you should wait a week or two before you help them out!

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.



Grease both O-rings and the center spacer before re-installing them in the cartridge body. Then snap the cartridge cap back on, and wipe off excess grease.

Brian is as organized as he is fast. His main toolbox contains: an assortment of Allen drivers, which provide more leverage and are less likely to strip screws; Phillips- and slot-head screwdrivers; needle-nose pliers for gripping small parts; side-cutters for heavy jobs such as cutting wing wire; containers of differential and thrust-bearing grease for trackside rebuilds; Loctite® thread-locking compound; and small pieces of Scotch-Brite pad for polishing metal parts, e.g., shock shafts.

by John Howell



"Where does he get those wonderful toys...?"



Left: the key to having a well-prepared car is organization! Here, Brian wrenches on his Team Losi® Double-X buggy. Note the Competition Electronics® TURBOthirty and TURBOcharger, the fan (it gets hot in Southern California!) and the motor lathe. To prevent any small parts from rolling off the table and being lost, Brian always works over a small piece of indoor/outdoor carpet.



Right: so what does the national and world champion do when his pit space gets cluttered? He does what the rest of us do: he piles his extra junk into anything he can find—like this spare wheel, for instance.



To power his Double-X, Double-XT and Yokomo® YZ-10 vehicles, Brian uses Trinity's® newest Dirtinator modified motors. His motors range from 11 to 13 turns; he chooses the one that will best suit the track on which he's racing. He also uses Point Blank® CA to glue his tires to the rims and to make minor repairs.

Brian keeps a full assortment of hardware on hand for an emergency. A clear-plastic organizer box is great for keeping all the little bits and pieces separated and easy to find.



PHOTOS BY TONY DONDALSON

KINWALD

WHAT MAKES national and world champion Brian Kinwald so fast? Is it his cars? Well, obviously, you need a competitive car to stay at the head of the pack. Could it be his skill? Of course, you must be able to get around the track quickly without hitting anything—or anyone. What about dedication? Does that play a part in his success? We've often heard that Brian is the most dedicated racer out there right now. He practices almost every day and races just about every weekend at his local track, SoCal R/C Raceway. So they must be the keys to his success—the cars, the skill and the dedication—right? In fact, it's a combination of all these.

To top it all off though, Brian knows he has to have the right tool for the job, so his pit space is completely set up with everything he needs to keep his racing rides in top form. We're lucky enough to be able to look at what the champ has in his pit space.

A Dremel® rotary tool is an important feature of Brian's pit area. It will do all types of grinding, drilling, milling and polishing chores. Using his Dremel tool, Brian modified his buggy's rear arms (adding fourth and fifth shock-mounting holes) and made a slot in its rear bulkhead to accommodate the battery's solder tab when Brian runs the pack in the rearward position.

Whenever he has to measure size and length exactly, Brian uses a set of Mitutoyo calipers. He uses them to set shock-spring pre-load and to measure shock body and shock-piston diameters and the overall shock lengths (to make sure the left and right are equal).

Right: an off-road racer's essential arsenal!—shock oil, spare suspension pieces, tie-rods and spare chassis. Brian is always sure to have the right parts on hand to make fast—but good—repairs and modifications.



*Addresses are listed alphabetically in the Index of Manufacturers.

You went crazy over Associated's latest buggy, which is completely new from the ground up. Most notable is the replacement of the traditional aluminum tub found on older RC10s with a molded-composite chassis. Piloted by Matt Francis, this new car is already an IFMAR off-road world champion, and more recently, Matt's brother Mark took it to the winners' circle at the Reedy Race of Champions.

- 2 Team Losi Double-X
- 3 Team Associated RC10 Worlds Car
- 4 HPI RS4
- 5 Team Associated RC10 Team Car
- 6 Team Associated RC10LSS
- 7 Trinity EV10
- 8 Yokomo YZ-10
- 9 Team Associated RC10LSO
- 10 Bolink Legend

Cars

1

Team Associated
RC10B2



YOUR TOP 10

1996 READERS' CHOICE AWARDS

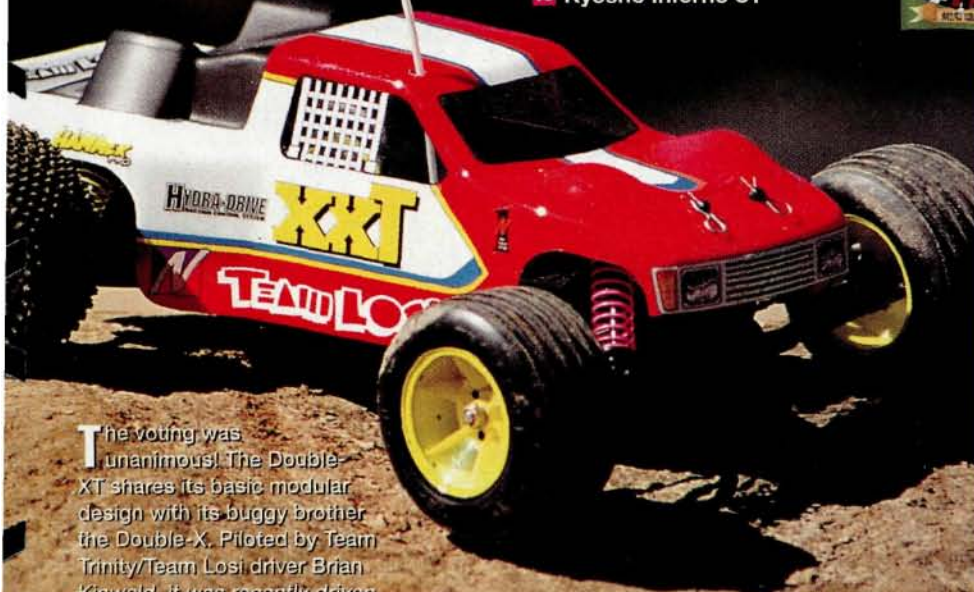
THIS TIME around, we decided to give **you command of the ship** and let you tell us *your* favorites. By and large, **your choices** are pretty much what we would have picked. But remember: if you don't like these choices, don't get mad at us. **You picked 'em!**

Trucks

1

Team Losi
Double-XT

- 2 Team Associated RC10T2
- 3 Team Associated RC10T
- 4 Team Associated RC10GT
- 5 Team Losi LX-T
- 6 Kyosho Pro-XT
- 7 Kyosho USA-1
- 8 Traxxas Rustler
- 9 Traxxas Stampede
- 10 Kyosho Inferno ST



Drivers

1 Brian Kinwald

The "BK Broiler" took top honors in this category by a wide margin. Brian, who drives for Team Trinity/Team Losi, is one of the fastest—if not the fastest—drivers in the country. He's an IFMAR World champ, and he holds numerous ROAR and NORRCA national titles in almost every off-road class. Most recently, he earned the ROAR modified truck and buggy titles in Savannah, GA.

- 2 Matt Francis
- 3 Mark Pavidis
- 4 Joel Johnson
- 5 Masami Hirotsaka
- 6 Scott Brown
- 7 Jack Johnson
- 8 Cliff Lett
- 9 Derek Furutani
- 10 Greg Hodapp

The voting was unanimous! The Double-XT shares its basic modular design with its buggy brother the Double-X. Piloted by Team Trinity/Team Losi driver Brian Kinwald, it was recently driven to victory at the ROAR Modified Nats in Savannah, GA.

1996 READERS' CHOICE AWARDS

1 Trinity Midnight

Your favorite motor features all-new technology that sets it apart from other stock motors; inside the 1.3mm-thick can we find an Internal Magnetic Flux Collector, narrow-cross-section bushings, a short-stack slotted armature with Thermal Transfer Gateways, V5.2 wet magnets and cooling tunnels.

Motors

- 2 Trinity Dirtinator
- 3 Trinity Green Machine 2
- 4 Reedy Ultra Sonic
- 5 Reedy Sonic
- 6 Maxtec Modifieds
- 7 Trinity Team Edition (epoxy-balanced)
- 8 Maxtec 24-degree stock motor
- 9 Motor Man Stock Master
- 10 Peak Performance Limited Edition



Which Race Would You Go To?

1 IFMAR Off-Road Worlds

The number-one favorite article was the coverage of the IFMAR Off-Road World Champs, so it's fitting that the same race was the top choice in this category. Who wouldn't want to witness the best of the best racing head to head? Or maybe you want to compete? Keep racing, and maybe, someday, you'll get there....

- 2 ROAR Off-Road Nats
- 3 Velodrome
- 4 Cactus Classic
- 5 Florida Winterchamps
- 6 NORRCA Off-Road Nats
- 7 Tamiya Championship Series
- 8 U.S. Oval Masters
- 9 Hobby Shack parking-lot races
- 10 NR/CTPA Worlds

Tracks

1 SoCal R/C Raceway, Garden Grove, CA

Home to many of the world's top drivers, SoCal R/C Raceway is one of the largest indoor off-road tracks in Southern California. It's well-known for its challenging track layout and for being the product-testing ground for most of the major West Coast off-road manufacturers.

- 2 Ranch Pit Shop—Pomona, CA
- 3 Yatabe Arena—Tsukuba City, Ibaraki Japan
- 4 Velodrome—Dominguez Hills, CA
- 5 Hobby Warehouse of Sacramento—Sacramento, CA
- 6 Tacoma R/C Raceway—Tacoma, WA
- 7 ABC R/C—Waukesha, WI
- 8 MnM—Corona, CA
- 9 Freedom Hill R/C track—Sterling Heights, MI
- 10 MHOR R/C—Aurora, CO



Favorite RCCA Article

995

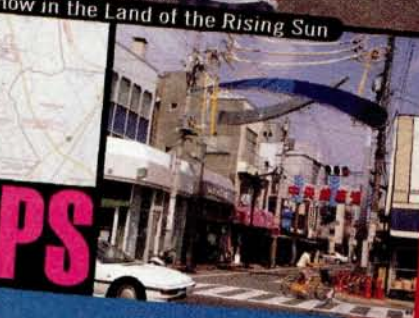
EVERY TWO YEARS, the International Federation of Model Auto Racing (IFMAR) organizes the 11th World Electric On-Road Championship. This time held in the U.S., the IFMAR World Championship drew in the top 100 model racers from 15 different countries. It features a series of races that are held on a 1/10 scale track. The IFMAR World Championship is the most prestigious event in the world of model auto racing. It is a truly international event, with racers from all over the world competing for the title of World Champion. The IFMAR World Championship is a truly international event, with racers from all over the world competing for the title of World Champion. The IFMAR World Championship is a truly international event, with racers from all over the world competing for the title of World Champion.

IFMAR

OFF-ROAD

U.S. Drivers steal the show in the Land of the Rising Sun

WORLD CHAMPIONSHIPS



1 IFMAR Worlds, December issue

C'mon, who wouldn't dig this article? Who's the fastest racer in the world? What about all the new racing products that are introduced at this event? Interested in what it's like racing in Japan? And what about the crazy bug-eating incident? Our readers just couldn't pass over this article.

- 2 Project Big Truck, Part 2—April
- 3 Clod vs. USA-1—October
- 4 Thrash Test: Team Associated RC10T2—September
- 5 Crazy R/C Stories—November
- 6 Readers' Rides of the Year—January '96
- 7 Sedan Slam—August
- 8 Thrash Test: Team Losi Double-XT—January
- 9 How-To: Build your own Track—January
- 10 How-To: Rebuild your Transmission—August



1 Novak Tempest Pro

Readers were totally won over by its exclusive Polar Drive Technology, six HYPERFET II transistors, new SUPER-FLEX 12 wire, 210 amps of braking power, One-Touch Set-Up™, CLC II current limiting and a heavy-duty BEC.

- 2 Novak Hammer Pro
- 3 LRP ICS Digital
- 4 Novak Racer
- 5 Tekin G-12
- 6 Tekin 411 G2
- 7 Tekin G-12c
- 8 Novak Rooster
- 9 Novak Duster
- 10 Novak 410 HPc

Speed Controls

Chargers

1 Competition Electronics TurboThirty

This "super-charger" has a ton of unique features! That's why it's your number-one choice. TurboFlex cell conditioning, multi-peak charging, programmable discharging up to 30 amps, automatic cycle, a motor run feature.... And it measures internal cell resistance and has an internal cooling fan and a printer option.

- 2 Tekin BC112A
- 3 Novak Rhino
- 4 Tekin BC67
- 5 Tekin BC112C
- 6 Novak Digi-Peak Plus
- 7 Tekin BC5A AC/DC
- 8 Tekin BC100L
- 9 Astro Flight 115D
- 10 Hobbico 900 AC/DC



Radios

We have a winner! The 3Ps features a 3-channel FM system, super-fast radio response, three-model memory, one-touch-trim memory, large easy-to-read LCD display, adjustable-rate control (ARC), response-control switch, end-point adjustment, variable dual-rate steering adjustment, stopwatch/lap timer with alarm and a servo-reversing selection.



1 Airtronics Caliber 3Ps

- 2 Futaba Magnum Jr.
- 3 Futaba Magnum Sport
- 4 JR Propo R-756
- 5 Airtronics XL2P
- 6 Futaba Magnum FM
- 7 Futaba Magnum PCM
- 8 Airtronics Caliber 3P
- 9 KO Propo EX-10
- 10 Airtronics Rival Sport



America's premier
1/12-scale race
turns 16

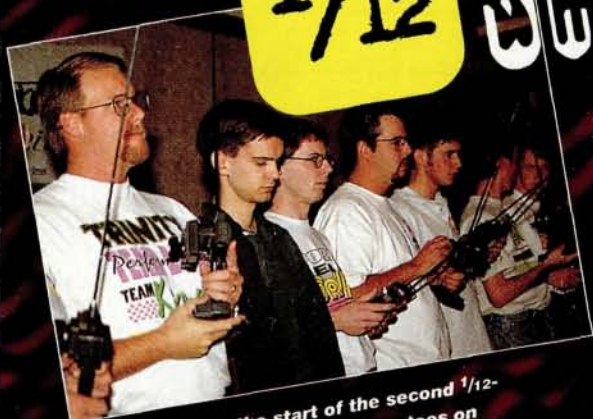


Terry Rott's top-qualifying and F1 Stock championship-winning Tamiya Ferrari 412 T1.

Cleveland

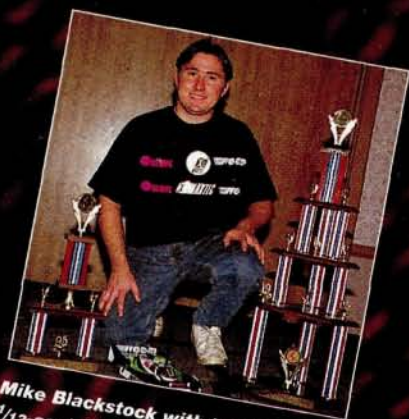
1/12 Scale Indoor Champs

by GEORGE M. GONZALEZ

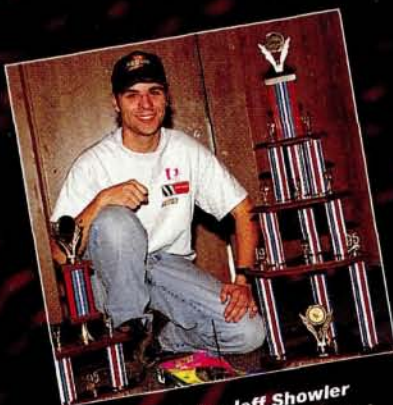


Drivers wait for the start of the second 1/12-scale qualifier. Check out the goatees on Joel Johnson (left) and Barry Baker (center). Hey, guys, what do you have in store for us next year?—mohawks?!

NOW IN ITS 16th consecutive year, the Cleveland 1/12-Scale Indoor Championships is the longest ongoing racing event in R/C history. During Thanksgiving weekend, hundreds of racers from the U.S., Europe and Canada gathered at the Holiday Inn at I-77 and Rockside Road in Independence, OH, to see who would become the new, exalted ruler of the carpet roadcourse.



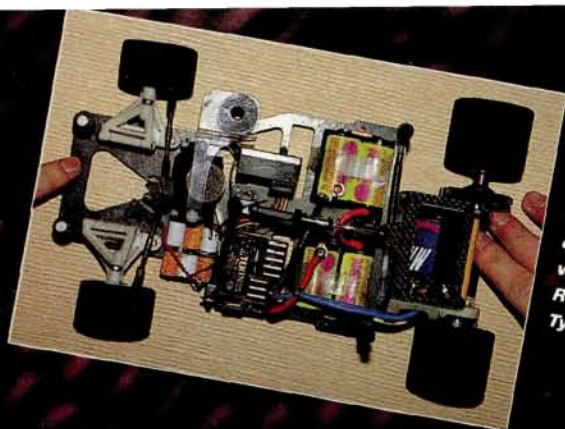
Mike Blackstock with his TQ and 1/12-scale Modified first-place trophies. Mike is one cool customer!



Canadian driver Jeff Showler with his TQ and 1/12-scale Stock first-place trophies. No doubt, he's a happy champion.



Three 1/12-scale IFMAR world champions (left to right): Oscar Jansen, Phil Booth and the current world champion, David Spashett.



Mike Blackstock's top-qualifying and 1/12-scale Modified championship-winning Wood Racing Typhoon.

and

QUALIFYING

• **1/12-scale Stock.** Canadian racer Jeff Showler was the man to beat in this class, but Michael Dumas, Wayne Gerber, Jacob Pritchard, Walter Henderson and Brian Berry all qualified on the same lap and were seconds behind Showler's 46/8:02.34 top-qualifying run. I was amazed at how evenly matched these drivers were, and at no point would I have been able to predict the outcome.

• **1/12-scale Modified.** This was truly a race of champions. The 1/12-scale world champion David Spashett set the pace early on by driving his Corally* SP12G2 to finish with an amazing 50/8:08.82 best time. Many believed that no other driver would be able to break the 50-lap barrier, because it would mean driving a perfect race. Rubbing the boards just once would foil any driver's chance of taking the TQ honors.

At 2:30 a.m. during the last round of qualifying, a tired and weary Mike Blackstock not only drove his Wood Racing* Typhoon beyond the 50-lap barrier, but also beat Spashett's best time by a full second. Josh Cyrul was the only

other driver to make a 50-lap run, but he had to settle for the third spot on the A-Main grid.

• **1/12-scale Masters Stock.** This is geared toward racers who are older than 35. These old-timers aren't as slow as you would think (god forbid, because I'm getting close to adopting the Masters title as well!). The top racers in this class were less than 2 seconds off the best 1/12-scale Stock times—not bad for a bunch of old-timers! Skip Starkey stole the show and barely beat Steve LaFara, Steve Rossi, Bill Jeric, Jerry Cyrul and Bud Bartos (who were all on the same lap) for the TQ honors.

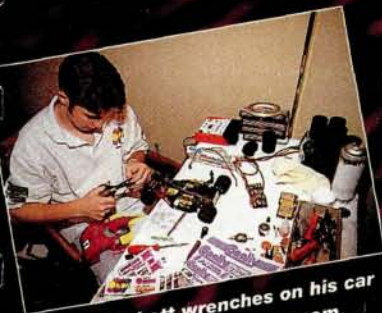


driving skill—not horsepower—that won races.

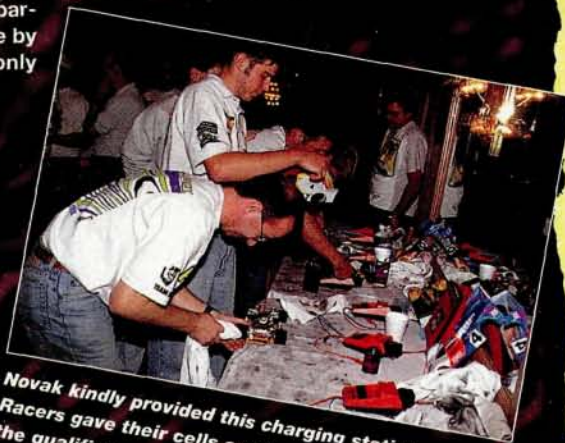
The most unusual aspect of this event, however, was where the drivers set up their pit areas; it was R/C cars and room service at this event

because the racers pitted out of their hotel rooms! Just imagine, you're working on your R/C car in your air-conditioned room while you watch a flick on Pay Per View. There's a knock on your door, and a waiter in a red vest brings your dinner on a silver platter—pretty classy!

A TV channel was reserved for up-to-the-minute racing information. If that wasn't enough, a special hotel room was set up for painting R/C bodies, truing tires and other messy little jobs. Naturally, all the furniture, portraits and fixtures were removed, and old bed sheets were used to cover the walls and the carpet. I have to admit, the Holiday Inn in Independence, OH, really knows how to roll out the red carpet, and I congratulate the management and staff for their hospitality.



David Spashett wrenches on his car in the comfort of his hotel room.



Novak kindly provided this charging station. Racers gave their cells one last jolt before the qualifiers and Mains.

NEW IN THE PITS

Some of Trinity's new products. Check out the hot, new Formula 96 Comm Drops!



Is R/C racing becoming too sophisticated?—no way! RACEtech's laser-guided caster/camber gauge in action.

• **RACEtech* Laser-Guided Alignment Tool.** As I was cruising around the hotel in search of a hot scoop, I poked my head into a room and found $1/12$ -scale racer Dan Louis tuning his car with some high-tech equipment. Centered on his workbench was a device that projected red laser beams, and when the micro-thin light beams hit the smoke from his soldering iron, his hotel room was transformed into a scene from the weekly TV series, "Tek War."

Dan combined a leveling device—The Smart Level—with current laser technology to come up with the first laser-guided alignment tool for R/C cars. The tool allows you to adjust the caster and camber on your car in microscopic increments. In fact, this device will make adjustments that are so fine, the human eye can't possibly detect them. But according to Dan, the difference is detectable on the track!

Although this product is still in the developmental stages, the word is out that RACEtech Motor Sports plans to add it to their line of R/C products; pricing and availability aren't available yet. I'm told that the unit will be a little pricey for most hobbyists, but some racers will spare no expense for that competitive edge.

• **Trinity Products Inc.** The folks at Trinity* kindly showed me some of their new products: the Midnight reverse-rotation stock

motor; the Monster Stock 3 30-degree NORRCA-legal stock motor; and the Quartz, which is a budget-priced 19-turn machine-wound motor. Also shown is Trinity's Formula 96 comm drops. This all-new formula has been getting rave reviews from racers across the country and abroad. The drops come in an easy-to-use applicator bottle, which has a long needle tip, and they help reduce comm glazing and boost rpm; check 'em out!

For more info, contact Trinity Products Inc., 1905 E. Linden Pl. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

• **Novak Electronics*.** Tyree Phillips gave me special level-3 security clearance so I could see the new R/C Analyzer. I wouldn't be a good reporter if I didn't pass the scoop on to you loyal readers, so here it is. This device will analyze and test your ESC; it will allow you to set up your brakes and high- and low-speed range (throw). In short, it will perfectly calibrate your ESC to your radio.

The unit will also cycle ESCs, check the load on the ESC's BEC system, return the ESC to its original factory setting and check receivers and servos for maximum performance. This unit is currently available, but its high price limits its marketability. For more info, contact Novak Electronics, 18910 Teller Ave., Irvine, CA 92715; (714) 833-8873; fax (714) 833-1631.



Novak's new R/C analyzer diagnoses your electronics. It will bake cookies, too!

• **F1 Stock.** Terry Rott was clearly on a mission: win at all costs. His Tamiya* Ferrari 412T was clearly the most dialed car on the track. Unfortunately, it wasn't the only red Ferrari on the track, and that made things confusing. At one

point, there were four bright-red Tamiya Ferraris on the track at the same time, but somehow each racer managed to stay focused on his own car, and they all finished very well.

It's always a pleasure to watch Team Trinity factory driver Joel Johnson in action. What surprises me most is how relaxed and cool-headed he always seems; maybe that's why he has won so many championship titles! Joel's Kyosho* Impress was extremely impressive (pardon the pun), but not as impressive as Rott's Ferrari, so the number-two slot on the first-ever F1 A-Main grid at the Cleveland Indoor Champs was graced with celebrity presence.

Frank Calandra Jr. also made the grade with one of Calandra Racing Concept's* new Speed Merchant F1 prototypes. The car seemed to hook up very well and ended up qualifying third overall—not bad for a maiden voyage.

A-MAIN ACTION

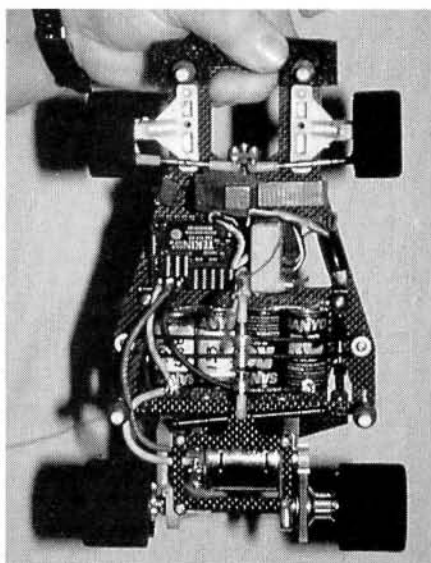
• **F1 Stock.** After a giant turn-one pile-up, Top Qualifier Terry Rott managed to squeeze through unscathed. Joel Johnson's Kyosho Impress was hot on the prowl and, after the first lap, Johnson was right on Rott's tail. By the 2-minute mark, Johnson got around

Rott and found a ton of open real estate in front of his car.

At around the 3-minute mark, Johnson decided it was time to change his left rear tire; unfortunately, the tire change took place on turn three—not in the pits—and Johnson found himself riding on three tires. Needless to say, he was out of the race. Meanwhile, Rott was back in the lead, but Frank Calandra Jr. was challenging him for his position.

Johnson managed to get his tire bolted back on, but his chances of making a strong finish were about as good as winning the California State Lottery. Rott and Calandra continued to battle it out to the very end, but at the 5-minute mark, it was Rott who crossed the line first with a 29/5:03.69 time to win the first-ever F1 class at the Cleveland Indoor Championships. Calandra blazed in right behind Rott to post a 29/5:04.01. Steve Smith rolled in to take third with a 28/5:04.87.

• **Masters $1/12$ -scale Stock.** Once again, the turn-one pileup was evident. Top Qualifier Skip Starkey used the poll position on the grid to his advantage to avoid the mess. Steve LaFara and Jerry Cyrul pulled off some serious stunt driving and



Skip Starkey's top-qualifying and Masters $1/12$ -scale Stock championship-winning CRC Carpet Knife.

bullied their way through the aftermath. At around the 3-minute mark, LaFara got pegged and was sent to the back of the pack, while Starkey and Cyrul charged ahead. Meanwhile, Carl Christy and Bill Jeric were quick to inherit LaFara's once-third-place position. LaFara wasn't so generous, though; by the next lap, he worked his way back through the pack and found himself in second place directly behind Starkey.

At around the 5-minute mark, LaFara kissed the washboard going around one of the sweepers and ended up flanking the rest of the pack (LaFara never recovered from this mishap and finished fifth).

At this point, Starkey had taken control of the race and was leading by 3 seconds. Jerry Cyrul secured second and wasn't challenged for the rest of the race. At the sound of the 8-minute buzzer, Starkey crossed the line to post a 45/8:07.99 time. Cyrul crossed a couple of seconds later to take second, while Christy—who was a lap behind the leaders—crossed the line to take third.

• **1/12-scale Stock.** Right from the start, Top Qualifier Jeff Showler charged in front, while Chad Coppock, Steve Charles and Scott Williams followed closely behind. At the 2-minute mark,

Showler had secured a half a track lead on the rest of the pack, Williams had secured the second-place position, and Charles and Coppock alternated for third. At around the 4-minute mark, Wayne Vince worked his way up from the back of the pack to the second-place position, Coppock secured third, Williams fell back to fourth, and Showler was way out in front.

At the 6-minute mark, there were so many position changes that it was hard to keep up with what was going on. Coppock managed to make his way up to second, Charles found himself battling it out with Vince for third, and Showler was lapping

WINNERS

Cleveland 1/12-Scale Indoor Champs

1/12-SCALE STOCK

Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires(f/r)	Traction Additive	Pinion/Spur	Active Front Caster?
1	1	Jeff Showler	Associated	Handout	Stage III	Novak	KO Propo	Protoform	TRC/Jaco	Paragon	32/88	yes
2	5	Walter Henderson	Associated	Handout	Stage III	Novak	Airtronics	Assoc.	Jaco/Jaco	Paragon	35/94	yes
3	10	Wayne Vince	Corally	Handout	Sanyo	Novak	JR	Protoform	Cooper/Cooper	Paragon	n/a	yes
4	8	Scott Williams	CRC	Handout	Rossi	Novak	KO Propo	Protoform	PSE/PSE	Paragon	36/94	yes
5	3	Wayne Gerber	Associated	Handout	Per. Match	Tekin	Airtronics	Assoc.	Assoc./Assoc.	FXII	31/96	yes
6	4	Jacob Pritchard	CRC	Handout	Stage III	Novak	Futaba	Protoform	Jaco/Jaco	Paragon	36/96	yes
7	2	Mike Dumas	CRC	Handout	Trinity	Tekin	KO Propo	Protoform	Jaco/Jaco	Trinity	34/104	yes
8	9	Steve Charles	CRC	Handout	Stage III	Novak	Airtronics	Protoform	Jaco/TRC	Paragon	n/a	yes
9	6	Brian Berry	Associated	Handout	Power Push	Novak	KO Propo	Protoform	Jaco/Jaco	Paragon	37/88	no
10	7	Chad Coppock	CRC	Handout	n/a	Tekin	JR	Parma/PSE	TRC/Yokomo	CRC	32/90	yes

1/12-SCALE MODIFIED

Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires(f/r)	Traction Additive	Pinion/Spur	Active Front Caster?
1	1	Mike Blackstock	Wood Racing	Maxtec	Orion	Tekin	JR	Protoform	Jaco/Jaco	Paragon	28/100	n/a
2	2	David Spashett	Corally	n/a	Orion	LRP	KO Propo	Corally	Corally/Corally	Paragon	29/100	no
3	6	Mike Lufaso	Associated	Reedy	Orion	Novak	Airtronics	Assoc.	Jaco/Jaco	Paragon	31/100	yes
4	3	Josh Cyrul	Associated	Reedy	Stage III	Novak	KO Propo	Protoform	Jaco/Jaco	Paragon	30/100	yes
5	8	Barry Baker	CRC	Maxtec	Zetec/Rossi	Novak	Airtronics	Protoform	Jaco/Jaco	CRC	27/100	yes
6	10	Andy Griffiths	Trinity	AGR	Trinity	Helbing	JR	Protoform	Jaco/Jaco	Paragon	29/100	yes
7	4	Phil Davies	Associated	Reedy	Orion	LRP	Sanwa	Protoform	Jaco/Jaco	Paragon	29/100	yes
8	5	Oscar Jansen	Corally	Corally	Orion	M.Troniks	KO Propo	Corally	Corally/Corally	Paragon	29/100	n/a
9	7	Joel Johnson	Trinity	Trinity	Trinity	Helbing	Airtronics	Protoform	Jaco/Jaco	Trinity	26/100	yes
10	9	Jon Orr	Associated	Reedy	Orion	Novak	KO Propo	Protoform	Jaco/Jaco	Paragon	27/100	yes

1/12-SCALE MASTERS

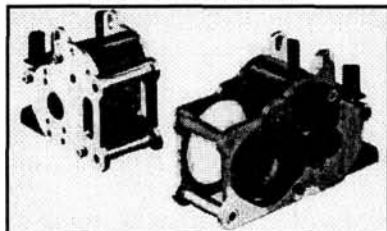
Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires(f/r)	Traction Additive	Pinion/Spur	Active Front Caster?
1	1	Skip Starkey	CRC	Handout	Sanyo	Tekin	JR	Protoform	TRC/TRC	Racer's Choice	37/95	no
2	5	Jerry Cyrul	Associated	Handout	Stage III	Novak	KO Propo	Protoform	Jaco/Jaco	Paragon	35/90	yes
3	7	Carl E. Christy	Associated	Handout	Fantom	Tekin	JR	Protoform	Jaco/Jaco	Paragon	31/88	yes
4	4	Bill Jeric	CRC	Handout	Major Woody's	Novak	Futaba	Protoform	TRC/TRC	Paragon	35/90	yes
5	2	Steve LaFara	Wood Racing	Handout	Ballistic	Novak	JR	Protoform	TRC/TRC	Paragon	36/88	no
6	3	Steve Rossi	CRC	Handout	Rossi	Tekin	KO Propo	Protoform	Jaco/Jaco	Paragon	34/98	yes
7	8	Bob Curtis	CRC	Handout	Major Woody's	Novak	Futaba	Protoform	TRC/TRC	Paragon	35/90	yes
8	10	Ken Pepe	Associated	Handout	Power Push	Tekin	KO Propo	Assoc.	Yokomo/Yokomo	TRC	34/88	yes
9	9	Junior Norton	Corally	Handout	Orion	Novak	KO Propo	Protoform	TRC/TRC	n/a	n/a	n/a
10	6	Burt Bartos	Associated	Handout	n/a	Novak	KO Propo	BRP	TRC/Jaco	n/a	n/a	n/a

FORMULA ONE

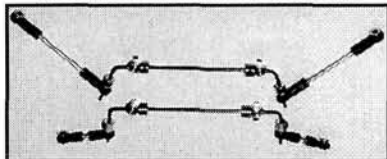
Pos	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires(f/r)	Traction Additive	Pinion/Spur	Active Front Caster?
1	1	Terry Rolt	Tamiya	Handout	SCR	Novak	Airtronics	Tamiya	TRC/TRC	Paragon	27/100	yes
2	3	Frank Calandra Jr.	CRC	Handout	Sanyo	Novak	JR	n/a	Jaco/Jaco	CRC	30/100	n/a
3	8	Steve Smith	Kyosho	Handout	World Class	Novak	JR	Kyosho	Jaco/Jaco	Paragon	29/100	no
4	5	Brett Polivka	Corally	Handout	Perfect Match	Helbing	Airtronics	Corally	Corally/Corally	Paragon	28/104	no
5	6	Skip Starkey	Tamiya	Handout	Sanyo	Novak	JR	Tamiya	TRC/TRC	Racer's Choice	30/100	no
6	10	Tyree Phillips	Tamiya	Handout	Orion	Novak	n/a	Tamiya	Tamiya/TRC	Paragon	30/100	no
7	7	Bill Jeric	Kyosho	Handout	Power Push	Novak	KO Propo	Kyosho	TRC/TRC	Paragon	29/100	yes
8	9	Carl E. Christy	Kyosho	Handout	Fantom	Tekin	JR	Kyosho	Jaco/Jaco	Paragon	28/98	no
9	2	Joel Johnson	Kyosho	Handout	Trinity	Novak	Airtronics	Kyosho	Jaco/Jaco	Trinity	25/100	yes
10	4	Wayne Vince	Corally	Handout	Stage III	Novak	JR	Protoform	Pro-Line/Tamiya	Paragon	n/a	no

TECH RACING

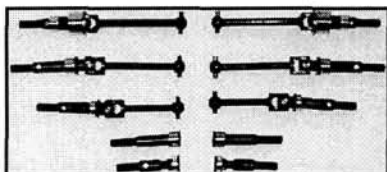
Superior Hop-Up Parts for Tamiya
4WD FWD M-Chassis



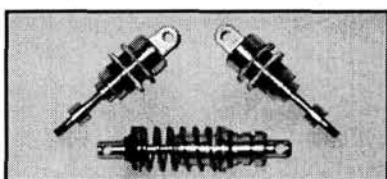
Lightweight M-Chassis Duraluminum Gear Boxes
4wd Conversion Kit Available for M-Chassis !!!



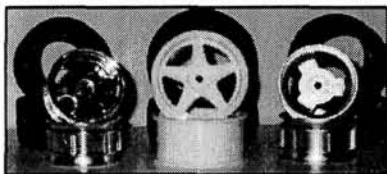
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CLEVELAND CHAMPS

cars as he enjoyed a 6-second lead over his closest competitor.

At the sound of the buzzer, Showler blazed across the finish line to post an amazing 45/8:01.26. Vince rolled in second with a 45/8:07.59, and Williams finished third with a 45/8:08.12. I should mention that seven out of 10 cars in this heat finished with 45 laps—talk about close racing!

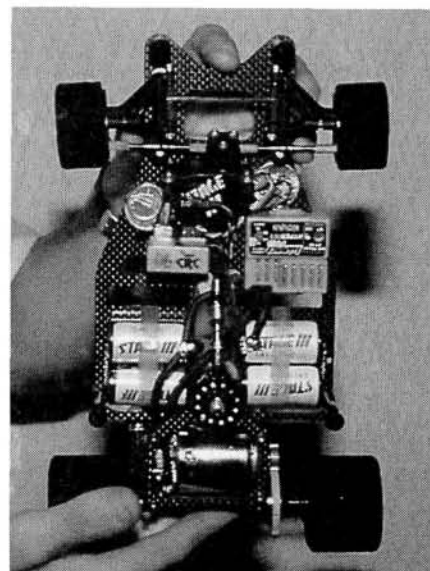
• **1/12-scale Modified.** There was tension in the air prior to the start of this class because of some last-minute computer problems. Despite their sweaty hands, the drivers waited patiently for the start of this ever-so-important race heat. David Spashett looked confident as he waited for the tone, and Mike Blackstock had fire in his eyes that would scare Hulk Hogan. Meanwhile, Joel Johnson and Barry Baker compared their new goatees, and me?—well, I could tell that this race was going to be a real battle.

The buzzer sounded, and they were off. Wow, what an exceptionally clean start! The spectators cheered as the drivers completed the first lap without a single mishap. Blackstock took the lead and set an amazing 54-lap pace (a hard act to follow!). David Spashett was less than an inch away as he drafted Blackstock's Wood Racing car through the intricate chicane section. Right before my eyes, I witnessed a beautiful sight: Phil Davies got in line behind Spashett and formed a three-car draft—totally awesome!

At the 3-minute mark, a few of the cars became tangled, and Josh Cyrul was now in third place, while Blackstock and Spashett continued to battle it out at a 58-lap pace. I could only imagine the pressure Blackstock was under having Spashett—the world champion—a microsecond behind. Meanwhile, Joel Johnson started to make his way up the pack and claimed the fourth-place position. Unfortunately, a few seconds later, Johnson was involved in a four-car pileup, which put him out of the race on lap 33.

With 7 minutes down, it was inevitable that Spashett would make a move and claim the first-place position. Going down the chicane section, both leaders missed an overturned car by millimeters and got back on course as if nothing had happened; these are the best drivers I've ever seen! Would their batteries hold up to this incredible pace? Would Blackstock finally crack under the immense pressure caused by Spashett? Would I have any nails left after this race?

With less than 40 seconds left, Blackstock made his first mistake, and Spashett took the lead. You don't give someone like Spashett any opportunities, because he'll bury you in the carpet!



Jeff Showler's top-qualifying and 1/12-scale Stock championship-winning Associated* RC12LS.

Would Blackstock let him get away with this?—no way! With less than 20 seconds left, Blackstock said, "Move over buddy; this is my race," and he took the lead back going through one of the hairpin turns. The spectators, racers, turn marshals and even the announcer (OK; me, too) went absolutely hysterical as these two world-class racers battled it out.

As the final seconds ticked away, Spashett's car started to slow down. Oh no! His batteries dumped! Meanwhile, Blackstock pulled away from him like a slingshot and crossed the line with power to spare. Blackstock finished the race with an amazing 50/8:09.49 to win the Championships. Spashett barely secured second with a 49/8:04.42, and Mike Lufaso took third after a lot of position juggling. What a race!

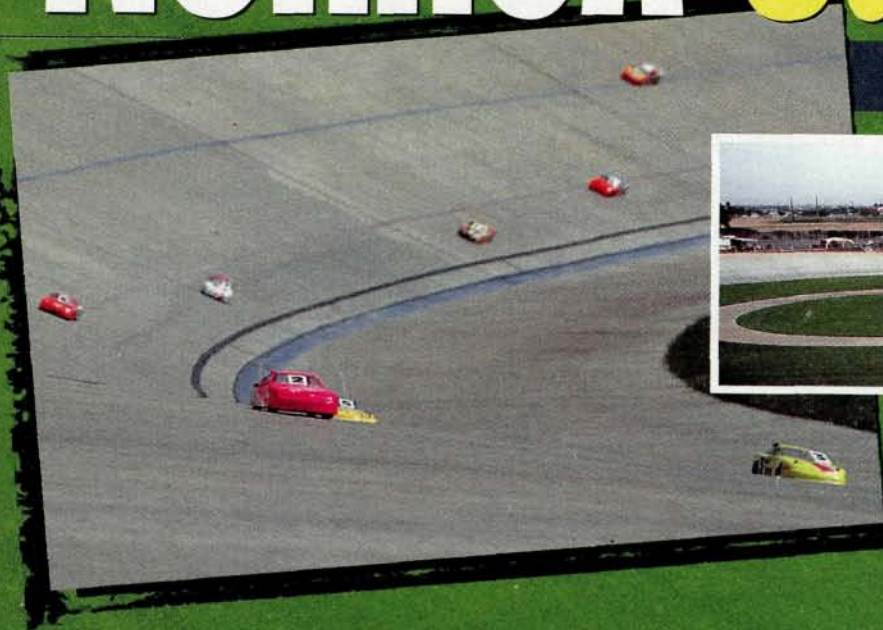
SUMMING IT UP

This was the first time I covered the Cleveland 1/12-Scale Championships, and I honestly didn't know what to expect. But this was one of the most exciting races I've ever covered. I have a newfound respect for these racers, because 1/12-scale racing requires precision driving and nerves of steel. I congratulate Mike Blackstock for his incredible performance and all the other racers who traveled thousands of miles to attend.

Special thanks to Fantom Racing, Parma/PSE, BRP, Dynamite, HPI, Robinson Racing and CRC, Bolink, Associated, Novak, Rivergate, Niftech, RACetech and Futaba for their generous sponsorship. If you're ever in Cleveland around Thanksgiving, check out this event. Better yet, check into one of the rooms, order some room service, and wrench on your R/C car.

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.

Superspeedway action at NORRCA Super Oval



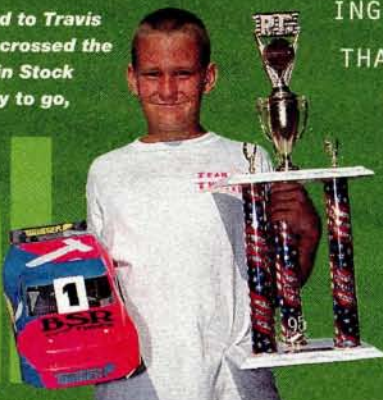
IT WAS A SIZZLING WEEKEND AT THE OLYMPIC VELODROME IN CARSON, CA, FOR THE NORRCA SUPER OVAL WINTERFEST. NORRCA PRESIDENT J.R. SITMAN DID AN OUTSTANDING JOB OF SUPERVIS-

Victory belonged to Travis Peterson as he crossed the finish line first in Stock NASTRUCK. Way to go, Travis!

ING THE EVENT AND ENSURING THAT EVERYTHING RAN SMOOTHLY.

HE EVEN MADE TIME

IN HIS BUSY SCHEDULE TO COMPETE IN A RACE. THE EVENT WAS SPONSORED BY TEAM ASSOCIATED, NOVAK ELECTRONICS, PARMA, BSR RACING TIRES, TRC, DAHM'S, STEALTH BATTERIES, BOLINK AND KIMBROUGH PRODUCTS.



i
Oval

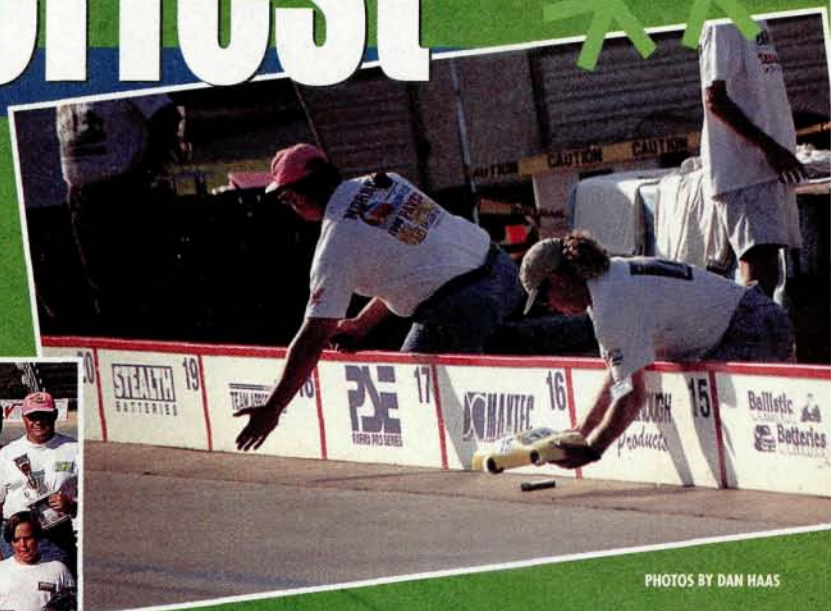
he Olympic Velodrome

al Winterfest

by DAN HAAS



One comes in and one goes out: pit stops were plentiful in the Superspeedway event.



PHOTOS BY DAN HAAS



The lucky winners at the NORRCA Winterfest.

Modified NASTRUCK winner David Markert and second-place winner David Campbell show off their trophies.



Kyle Mohan picked up a trophy for winning the Sportsman Modified class.



Expert Stock winner Steve

Lantz put on quite a performance. All his hard work paid off; check out the nice trophy.





Above: Mike Blackstock TQ'd in the Invitational class with a new record of 20 laps. He also took the trophy in Superspeedway. Great job, Mike! Left: Novak's Tyree Phillips hard at work in the pits.

There were eight racing classes: Sportsman Stock, Expert Stock, Sportsman Modified, Expert Modified, Stock NASTRUCK, Modified NASTRUCK, Superspeedway and Invitational. Superspeedway had three qualifying rounds; the other classes all had four. There were also the NASTRUCK Speed Run and the awesome Unlimited Speed Run. Racing was fast and furious, with speeds that exceeded 60mph. Multi-car pileups were abundant, especially in Expert Modified.

QUALIFYING

In the Invitational class, Mike Blackstock burned up the track and set a new record with a 20/4:16.84 time! Patrick Kivin took the TQ honors in Expert Stock with less than a 1-second lead over Joe Blackburn. John Ligons led the way in Expert Modified with a 19/4:06.57 time. In Stock NASTRUCK, Travis Peterson aced the competition as the only driver to complete 16 laps. David Markert won the TQ position in Modified NASTRUCK with a 17/4:08.13 time. In the gruelling Superspeedway event, Roger Pane completed 100 laps with a time of 23:05.21 for the TQ position.

A-MAIN ACTION

• **Expert Stock.** Top Qualifier Patrick Kivin had a rough start and dropped to fourth. Gary Owen shot to the front of the pack, with Joe Blackburn and Steve Lantz following closely behind.



Racers have their cars inspected at the tech table.



Kent Clausen takes a quick ride on a motor scooter.

David Markert's NASTRUCK-Speed-Run-winning truck.

NORRCA SUPER OVAL WINTERFEST

Stock NASTRUCK

Pos	Qual	Name
1	1	Travis Peterson
2	2	Richard Dowdy
3	3	Jerry Bassett
4	4	Les Abramson
5	6	Bob Lencioni
6	8	Derek Franzen
7	7	David Campbell
8	5	Larry Ruby

Modified NASTRUCK

Pos	Qual	Name
1	1	David Markert
2	2	David Campbell
3	4	Dennis Brown
4	3	Lee Patton
5	10	Scott Pettitclerc
6	11	Ed Allen
7	9	Daryl Lane
8	5	J.R. Sitman
9	8	Tom Kendall
10	15	Tom Bowlin
11	6	Bruce Chong
12	13	Ron Ponce
13	7	Sally Ham
14	12	Jim Greenmeyer
15	14	Chad Everts

Expert Stock

Pos	Qual	Name
1	3	Steve Lantz
2	2	Joe Blackburn
3	5	Brad Olson
4	6	Luke Sink
5	10	Chas Cuzzoni
6	15	Les Abramson
7	13	Bob Sarnelle
8	7	Odie Duncan
9	11	Scot Pettitclerc
10	17	David Lopes
11	16	Larry Howard
12	14	Perry Lusk
13	8	Peter Riggs
14	12	Rick Noel
15	18	Todd Naley
16	9	Dan Quick
17	20	Mike Smith
DNS	19	Howard DeLong
DNS	1	Patrick Kivin
DNS	4	Gary Owen

Expert Modified

Pos	Qual	Name
1	5	Ed Allen
2	9	Craig Baxter
3	11	Jim Collis
4	18	Steve Saik
5	20	Steve Ruffin
6	6	Patrick Kivin
7	16	Joe Myers
8	13	Mark Frost
9	2	Bill Rainier
10	15	Chuck Burns
11	10	Tom Gerow
12	3	Steve Crevantes
13	8	Steve Nelson
14	19	Ken Buzzars
15	4	Cortney Able
16	1	John Ligons
17	17	Randy Oakes
DNS	12	Gary Lundy
DNS	7	Bill McAneney
DNS	14	Scott Bassett

Sportsman Stock

Pos	Qual	Name
1	3	Steve Pacquin
2	1	Chris Fast
3	4	Ed Snell
4	6	Phil Brisk
5	5	Marc Blum
6	8	Todd McGuire
7	9	Beecher Noguchi
8	7	Frank Yates
9	2	Tom Donnelly

Sportsman Modified

Pos	Qual	Name
1	4	Kyle Mohan
2	6	Tim Price
3	5	Robert Porter
4	7	Ron Aggus
5	2	Robert Setterquist
6	8	Steven Jacques
7	12	Bruce Chong
8	13	Dennis Dunn
9	14	Dave Walton
10	3	Mike Dyer
11	9	Don Natale
12	11	Joshua Utley
13	10	William Tillman
DNS	15	Andy Acosta
DNS	1	Marc Mitchell

Invitational

Pos	Qual	Name
1	2	Rick Hohwart
2	8	Frank Killam
3	1	Mike Blackstock
4	6	Christopher Bowers
5	16	Roger Pane
6	11	Greg Larsen
7	2	Michael Ellis
8	10	Tyree Phillips
9	4	John Peterson
10	13	Lawrence Pipp
11	14	Don Ham
12	5	Danny Egger
13	15	Steve Chamberlain
14	3	Gary Hamilton
15	7	Jerome Thompson
16	9	Erik Steenhoven
DNS	17	Kent Clausen

Superspeedway

Pos	Qual	Name
1	6	Mike Blackstock
2	5	Roger Vorba
3	2	Cliff Lett
4	3	Bob Novak
5	15	Mark Frost
6	13	Doug Adams
7	1	Roger Pane
8	7	Ted McDonald
9	8	Kent Clausen
10	4	Mace Horowitz
11	12	John Peterson
12	9	Thomas Logan
13	14	Derek Povah
14	17	Terry Van
15	16	Eric Larsen
16	10	Bill McAneney
17	11	Jay Kimbrough

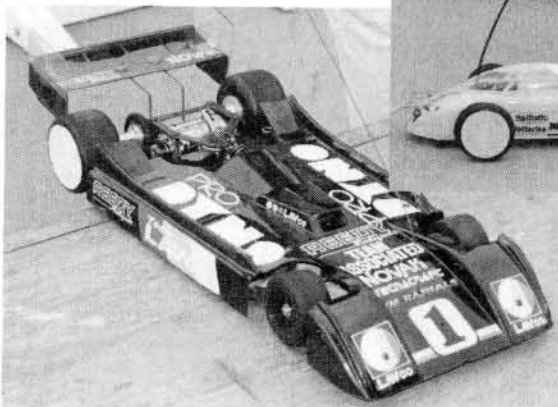
Unlimited Speed Run

Pos	Name	mph
1	John Peterson	84.08
2	Danny Egger	83.46
3	Gary Hamilton	82.14
4	Ted McDonald	79.95
5	Derek Povah	76.62
6	Kent Clausen	71.34
7	Bob Novak	68.76
8	Cliff Lett	67.86
9	Frank Valentine	61.36
10	Sally Ham	60.45
DNS	Bill McAneney	

NASTRUCK Speed Run

Pos	Name	mph
1	David Markert	67.06
2	Travis Peterson	66.98
3	Sally Ham	63.20
4	Tom Kendall	62.99
5	Bill McAneney	60.64

NORRCA SUPER OVAL WINTERFEST



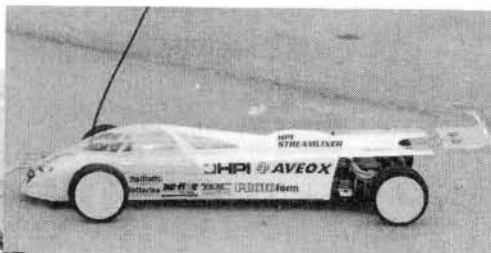
One of several crashes took its toll on Owen and sent Lantz, Blackburn and Kivin into the number one, two and three positions. Lantz finished first with 17/4:07.78, followed by Blackburn with 17/4:08.78. Kivin was disqualified, putting Brad Olson in third.

• **Expert Modified.** "Demolition derby" would have been a more appropriate name! TQ John Lignons finished one lap and then crashed and had to sit out the rest of the race. Steven Cervantes took the lead, followed by Patrick Kivin and Bill Rainier. About a minute and a half into the race, Cervantes was involved in a pileup and gave Kivin the lead, with Rainier and Craig Baxter following. All the crashes sent parts flying all over the track, so it was impossible to predict the outcome of this race. Kivin and Rainier ended up in the number six and nine positions, and the number five car, driven by Ed Allen, dodged all the wreckage and pulled out in front. Allen finished first with an 18/4:05.37 time, followed by Baxter with an 18/4:08.74 time.

• Stock NASTRUCK.

Early on, Top Qualifier Travis Peterson lost the lead to Richard Dowdy. Les Abramson stayed close behind Peterson, with Jerry Bassett in fourth. Meanwhile, Dowdy and Peterson battled it out for first. With less than 30 seconds left, Peterson squeezed by Dowdy to take first with a 15/4:04.01 time. Dowdy posted less than a second behind Peterson, and Bassett crossed third with a 15/4:06.17 time.

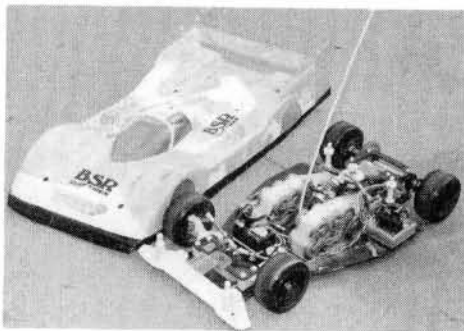
• **Modified NASTRUCK.** David Campbell had a clean start and took the first position from Top Qualifier David Markert. J.R. Sitman captured second place, with



Some awesome-looking Unlimited Speed Run cars.

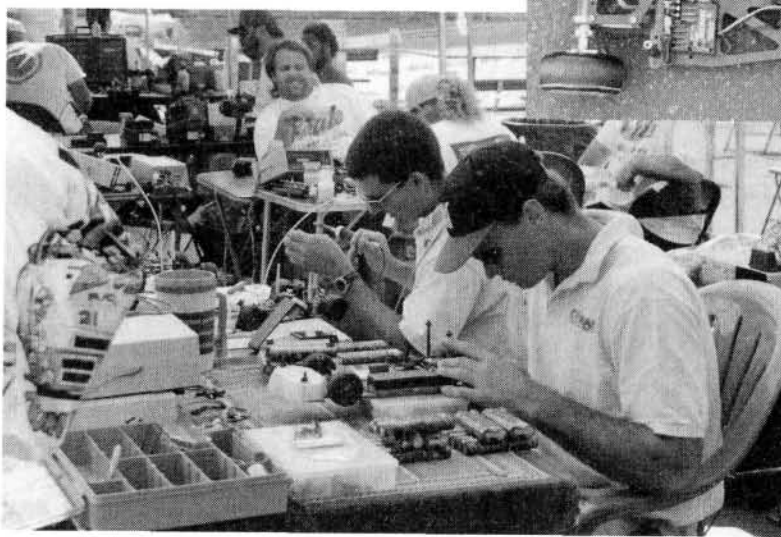
Markert on his tail. Markert made his move and gained control of the field. Markert finished first with a 17/4:08.30 time. Campbell came in second with 16/3:56.52.

• **Superspeedway.** Early in the race, Cliff Lett picked up the lead with Roger Pane and John Peterson following. Lett was the first to pit after 10 laps. Peterson moved to the second spot, and Pane came in to pit after 12 laps. Peterson and Mike Blackstock lasted 13 laps before pitting. The pit crews were amazing to watch as they switched batteries at the speed of light. An awful crash at turn three sent cars and parts flying in every



behind Blackstock, maintaining their positions despite all the crashes and flying parts. In the last half of the race, Blackstock dropped to second, leaving Hohwart in the lead. With 30 seconds to go, Blackstock lost his second-place position leaving Hohwart and Killam to battle it out for the finish. Hohwart won with a 2-second lead over Killam. Blackstock had to settle for an honorable third-place finish.

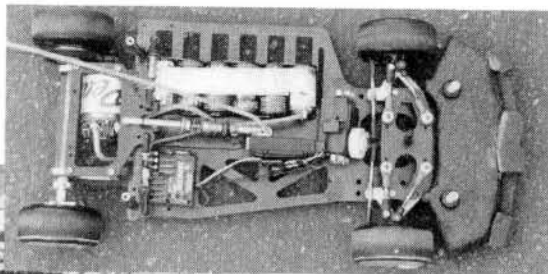
• **Unlimited Speed Run.** This was the most amazing race of the event; every



The pit area was very crowded. What's so funny, Rick? Laughing about how you smoked everyone in the Invitational class?

direction and put Bill McAneney out of contention. Lett kept his lead, with Roger Vorba in second, Roger Pane in third and Blackstock in fourth. Blackstock managed to pull out in front with Lett and Vorba following close behind. Blackstock finished the race with a time of 200/45:20.11. Vorba finished second with 194/45:27.62, and Lett was third with 192/45:30.63.

• **Invitational.** Top Qualifier Mike Blackstock had a slow start, but managed to take the lead back early on. Rick Hohwart and Frank Killam followed closely



Mike Blackstock's Superspeedway-winning Wood Racing* car—pretty trick!

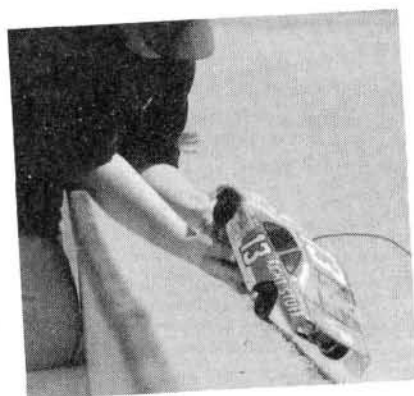
driver had three laps to come up with his fastest speed. Kent Clausen ran his amazing new HPI* Streamliner car equipped with an Aveox* motor. He had some traction problems and ran an 11-second lap at an average speed of 71.34mph.

With his totally modified Associated* 10LSS, John Peterson posted an 84.08mph run—the fastest of the event. His car was equipped with a modified Composite Craft* chassis, a Twister* 10-turn drag motor, 18 1000 SCRS cells, a Novak* 828 speed control, BSR* silver caps and a Protoform* Nissan P35 narrow body. John's gear ratio was 4.30:1.

The "Most Amazing Crash" award went to Bill McAneney, who came into turn three like a bullet and plowed into the washboard at a catastrophic speed. Needless to say, his car was totally destroyed. In fact, there wasn't a usable part left on it (unless you could sweep

up the graphite dust and hand-lay a new chassis).

• **NASTRUCK Speed Run.** David Markert was the big winner with an amazing average speed of 67.06mph—not bad for a pickup! Travis Peterson posted 66.98mph, which put him in second. Sally Ham, who has earned a reputation as the fastest woman in R/C, posted a 63.20mph best lap to take third. Tom Kendall got up to 62.99mph for fourth. Bill McAneney had better luck in this class and managed not to destroy his truck (he demolished his car in the Unlimited Speed Run). Bill's 60.64mph put him in fifth.



If you want to win enduro races, battery changes have to be lightning-fast.

The '95 NORRCA Super Oval Winterfest was a complete success. I congratulate all the winners for their tremendous performances and thank all the sponsors for their support. This is the first race I've covered for *R/C Car Action*, and I hope I'll be back next year. I know one thing for sure: I'm going to dust off my oval car and build an Unlimited Speed Run car; they're 100-percent adrenaline! Remember: keep the revs up, and stay below the blue line!

* Addresses are listed alphabetically in the Index of Manufacturers on page 176.

RACING CAR KITS

Assoc. B2 Buggy	\$189.95
Assoc. T2 Racing Truck	\$189.95
Losi XX Team Buggy	\$184.95
Losi XXT Team Truck	\$189.95
Losi XX Sport W/Elect.	\$129.95
Losi XXT Sport W/Elect.	\$139.95
HPI Super F1 F Type	\$189.95
HPI RS4 4wd W/body	\$199.95
RC10GT Team w/TNTR	\$319.95
RC10GT Sport w/TNTR	\$259.95
Losi GTX Team w/TNTR	\$324.95
Losi GTX Sport w/TNT	\$269.95



Racing Motors And Engines

Trinity Midnight 24Deg	\$24.95
Trinity Green Machine 2	\$22.95
Trinity Slott Machine 2	\$22.95
Eastcoast Black Dyno	\$29.95
O.S. CZ-R Engine .12	\$89.95
O.S. CZ-Z Engine .12	\$139.95
O.S. CZ-R Pull Start .12	\$119.95
HPI Nitro Star .15 PS	\$99.95
HPI Nitro Star .15 SS, PS	\$149.95
Thunder Tiger .12	\$79.95
RC10GT	

Speed Controls

Novak Racer Megafet	\$89.95
Novak Duster Megafet	\$72.95
Novak Rooster Reverse	\$72.95
Novak Explorer	\$59.95
Tekin 412p	\$62.95
Tekin G12c Goldfet	\$114.95
Tekin P12 Prostar	\$89.95
Tekin Formula 10	\$59.95
Duratrax Spike ESC	\$39.95
Shumaker ESC	\$49.95
Futaba 210 Reversible	\$64.95

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Dyn 1500mah Stick 6 cell	\$14.95
Dyn 1500mah Hump 7 cell	\$18.95
Trinity Spec 4 cell	\$14.95
Bolink Legends 4 cell	\$16.95
ESP Matched Stick 1700	\$39.95

RACING BODIES

Protoform 97 Granprix SS	\$14.95
Protoform 96 TBird SS	\$14.95
Protoform 95 Montecarlo SS	\$14.95
Hot Bodies Avenger SS	\$14.95
Hot Bodies TBird SS	\$14.95
Hot Bodies Montecarlo SS	\$14.95
Hot Bodies MC Wide	\$14.95
Bolink 96 TBird SS	\$14.95
Bolink 96 GranPrix SS	\$14.95
Bolink Montecarlo Wide	\$14.95
Andys B2 Painted	\$27.95
Protof Rambunctious GT	\$14.95
Protof Nevada XXT	\$14.95

Chargers

Novak Rhino D.C. Peak	\$64.95
Tekin BC 67 AC-DC Peak	\$119.95
Tekin BC 112c AC-DC	\$189.95
Tekin 112A DC Peak Flex	\$118.95
Tekin 110 DC Peak	\$64.95
Dynamite Mega 1 AC-DC	\$25.95

Novak Tempest



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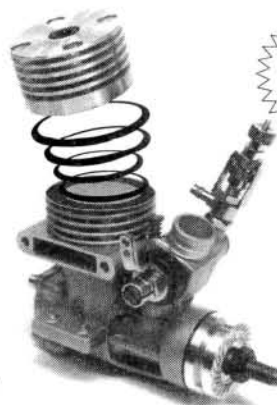


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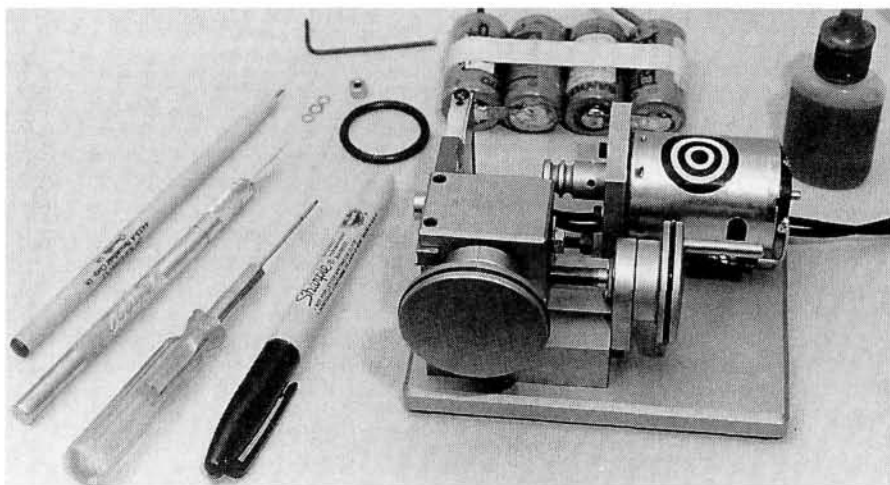
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by Doug Mertes



Install the motor, hook up the wires, set up the tool bit, and you're ready to go. I used a 4-cell pack, but you could use a low-voltage power supply.

Trinity "Tru-Lathe" Comm Lathe

A pro-level tool
for the serious
modified racer

COMMUTATOR LATHES should be a staple of every modified racer's arsenal of go-fast tools, because a good modified motor will only be competitive for a couple of runs before its power will start to decrease. Just when you've figured out how to gear and drive the thing, it starts to slow down. This is because the commutator face on the armature begins to wear out of round, and that makes the brushes bounce in their brush hoods. If the comm's surface is not perfectly round and smooth, that killer wind won't put you in the winners' circle.

The motor gurus at Trinity* are well aware of this problem. Their sponsored oval, off-road and roadcourse drivers are some of the fastest around, so it was only natural for Trinity to produce a comm lathe; it's a beauty—light, compact and very accurate. It also incorporates some new design aspects that set it apart from the competition:

- To prevent parts from shifting during shipment and use, all the upright parts are aligned with precision pins.
- An innovative, Teflon™, shaft-hold-down plate protects the tool tip and reduces friction in the V-grooves.
- A dual-grooved pulley makes it easier to true split-rotor armatures (yay!).
- The push-button switch has been installed exactly where you'd like it to be.

PUTTING IT TOGETHER

Unpack the box, and you'll find the lathe, some wire, a power plug, an O-ring, a pulley, a diode and instructions. First, read the entire instruction sheet. It includes specs and directions and maintenance and troubleshooting tips.

Use the included motor screws and washers to mount the motor on the center upright. The motor is not included, but you can use an old "doggo" stock motor, or a closed-endbell, 05-type motor as I did. Trinity even tells you how to put

**"I found
that cutting
the comm
had added
almost 1,500rpm
and 45 power
numbers!"**

together a zero-degree-timing, stock armature motor. For smooth operation, use a slow, cool-running motor—not a high-rpm, high-amp-draw motor. Follow the directions for pulley and O-ring adjustment. After you've tightened down the motor, follow the wiring diagram to complete the simple switch circuit. Attach the

provided plug, or use the connector of your choice. If you're going to use a power supply, you may want to install color-coded alligator clips. Be careful to run only 3 to 5 volts through the drive motor, because any more will make it run too fast to do the job properly.

The tool bit should be installed next, and this requires close attention. For the bit to work properly, its tip must be mounted at, or slightly above, the centerline of the commutator face. If it's mounted too low, it might catch on the comm slots. I saw this happen several years ago at a race. The armature flew at least 20 feet across the pit area, and the tool bit was completely ruined. Luckily, nobody was hurt! Pay attention to the diagrams, and I think you'll proceed without much trouble. To get it up high enough, I shaved a little paint off its surface, but it was no big deal. To make the job easier, I measured the distance from the deck to the tip with a pair of accurate digital calipers. You'll also need a 5/64 Allen wrench to tighten the setscrews. Trinity suggests that you practice setup with the carbide bit before you install an expensive diamond bit, and I agree. Diamond bits are abrasion-resistant, but they're very brittle, and the tiny diamond tip can be easily chipped; make sure you know what you're doing.



I checked the lathe with a pair of accurate calipers; it's very well-made!

Put the O-ring around the armature, drop a little oil in the V-grooves, and set the armature in the grooves. Make sure the commutator end goes under the Teflon™ hold-down. Run the O-ring around the rim of the drive pulley, then spin the armature with your finger to make the O-ring run true. To eliminate any side-to-side play, place two or three thin, 1/8-inch-diameter motor washers between the other end of the armature and the second upright. Also, to make it easier to see the distance from the cutter to the comm, I put a small square of white MonoKote trim on the lathe's base, under the armature.

Switch on the power, and make sure there are no weird vibes going on. If everything sounds smooth, run a felt-tipped marking pen across the face of the comm to make it easier to follow the cut. Some experienced racers eliminate this step, because they think it adversely affects the cut's

quality. A little WD-40 or Trinity/Revtech blue comm drops will lubricate the cutting action and produce a smooth surface.

Bring the tip of the tool close in to the left side of the commutator until you see a thin line begin to form on the comm's surface. Then draw the tool back one notch, and move it to the extreme left of the comm face. Move the tip forward again, and slowly and smoothly run it

across the commutator to a point that's just in front of the uncut lip at the wire ends. Draw back the tip, stop the motor, and inspect the commutator. It will often take only one or two thin cuts to make the comm face perfectly round and true.

Take out the armature, and draw a hobby-knife blade through the slots in the comm to remove leftover burrs and chips. I also run a ballpoint pen down the slots to remove any sharp edges that might catch on the brushes. To remove any remaining chips, spray the comm with a high-quality motor spray, and you're ready to put it back in your motor and kick some dirt!

DOES IT WORK?

As a baseline, I tested a 14-turn, double-wind oval motor on a LAVco* pro dyno and then removed the armature. I followed Trinity's directions for assembling the lathe and truing the commutator. After I had reassembled the motor, I ran another dyno test to see whether there was a difference. Still using the same



Good as new! This armature will tear up the track!

ARE WE THERE YET?

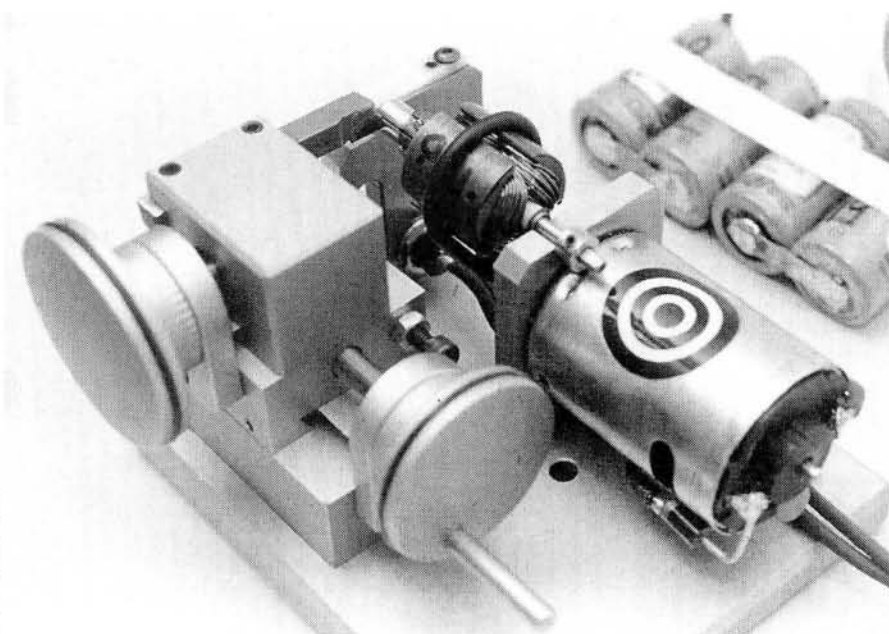
Almost! To use the lathe, you'll need:

- light oil, comm drops, or WD-40 spray to lubricate the comm while you're cutting it and to lubricate the armature shaft against the lathe's V-grooves;
- motor washers to shim the armature against the lathe's V-grooves;
- miscellaneous tools, including a hobby knife, pinion wrench, small axle collar and a ballpoint pen.

brushes and springs, I found that cutting the comm had added almost 1,500rpm and 45 power numbers! It was back in line with the dyno numbers it had produced before it had been run through a practice session, three qualifiers, and a Main—not too shabby!

LIKES AND DISLIKES

Overall, I really like this new Trinity lathe. It's small, accurate, and it does the job well. I especially like its high-quality construction and the way the switch has been mounted. The comprehensive instructions are full of useful tips, warnings and diagrams, but I wish they had included the 3/64 wrench you'll need to set up the tool bit. When you're used to the lathe, you'll probably want to upgrade to a diamond-tipped cutting tool, because it will provide a better finish than the carbide tip. Trinity sells one for this lathe: part no. 4105; price—\$85. I'm ready to go fast. Are you?



Set up the armature, turn on the power, and draw the tip from left to right. One or two passes will clean up most comms.

* Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■



Tekin BC110L

by Chuck Holmes



Small size and great performance make this a charger that everyone should check out.

A magnum charge at a reasonable price

WHETHER YOU'RE a team driver, a club racer, or a backyard enthusiast, you want a charger that charges your batteries fully, quickly, easily and, of course, at a reasonable price. The new Tekin* BC110L DC peak charger fits the ticket very nicely. Let's look at what it has to offer.

CHARGER FEATURES

The lightweight BC110L can charge 4- to 8-cell packs (which should satisfy almost all charging needs, from 1/12-scale racing to Clod Buster packs). It's equipped with external volt/ammeter jacks and has easy one-button operation.

The charger is DC-powered, and that means you can use a variety of power sources. A 12V automotive battery is your best bet because it supplies pure, clean DC power, but you can also use a regulated DC power supply, or a 4A to 10A automotive battery charger. The BC110L has an adjustable output range of 0.5 to 10 amps of linear current.

One of the most striking features of this charger is the absence of a large, finned heat sink on top of the case. Tekin tells me that, with its new 33KHz digital-switching circuitry, the BC110L can give high-performance linear charging and cool operation.

CHARGER OPERATION

Operating this charger is extremely easy. Simply attach the supplied input leads to your choice of power supply, attach your battery to the output leads, set the desired current with a twist of the calibrated amp dial, and push the button. It's that simple. The peak-detection circuitry takes over and charges your battery to its full capacity.

If you mistakenly attach the battery backwards, don't fret. The BC110L is equipped with a 20A fuse that will protect the charger from such mishaps (several spare fuses are included, but any 15A to 20A automotive fuse will work). If you want to slow-charge your batteries, the BC110L also has a trickle-charge mode.

We now know what the BC110L is supposed to do. Let's see if it lives up to our expectations.

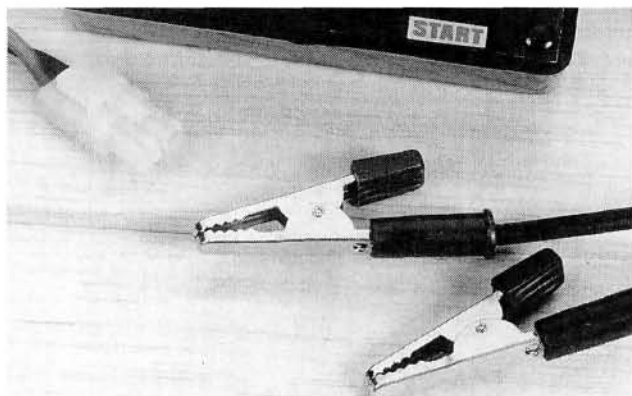
THE LIGHT-BAR TEST

For testing, I used a 10A automotive battery charger as my power supply (that's what most racers at my local track use). I wanted to provide results that were realistic to the average racer on a budget. I used the charger in its box-stock condition; I didn't change any of the connectors or leads. To represent as many variations as possible, I selected several batteries from my arsenal—a 4-cell Sanyo 1700 SCRC 1/12-scale race pack; a Sanyo 1400 SCR 6-cell, stock, off-road pack; a Sanyo 1700 SCRC matched, 6-cell, modified, off-road pack; a Trinity Ex-Spec Stick pack for parking-lot racing; and a Sanyo 1400 SCR 8-cell, Clod Buster pack.

I started by charging these packs as I've always charged them, and then I dumped them on a 20A light bar; I used a stopwatch to time the packs.

The BC110L can charge four to 10 cells. That covers everything from 1/12-scale racing to Clod Buster packs.





The BC110L charger is a DC charger, so to charge your batteries, you have to connect these included alligator leads to some sort of power supply.

Now that I had all my numbers to compare, I discovered an astonishing fact! All but one battery pack had an increased run time with the method outlined above, and the average increase was a whopping 15 seconds! I don't know about you, but that would be enough to prevent me from dumping within sight of the finish line. Fifteen seconds could be the difference between first place and the back of the pack.

THE BAKE OR BREAK TEST

For the final test, I enlisted the help of Ric Keen of Mini Motorsports, who coordinates R/C monster truck exhibitions, and Tim Crase of Crazy Racing, who makes custom, aluminum Clod Buster parts. We drove our Clod Busters as part of the halftime entertainment at the USA Motorsports Monster Truck Spectacular in Portland's Memorial Coliseum. (What could

be harsher on a charger than to charge 7- and 8-cell Clod Buster packs all day long?) The show went off without a hitch, and the Clods were a hit. Oh, by the way, the charger went all day without a break and did a fantastic job. It never false-peaked, and it never got overly hot. (Addresses: Ric Keen, Mini Motorsports, 9635 SE Reedway, Portland, OR 97266 [503] 774-0019; Tim Crase, Crazy

Racing, 14147 SE Bush, Portland, OR 97236 [503] 760-5980.)

FINAL THOUGHTS

When I first saw this charger, I was skeptical. It didn't even have a heat sink. How could a "high-performance" charger not have a heat sink? But I ran all the tests with an open mind. It handled the 4-cell, 6-cell and even 8-cell packs with ease. I was sure that our "Bake or break" test would burn it up; it was really brutal, but that charger knocked out almost two dozen 7- and 8-cell packs back to back for two days with no breaks at all! Well, my first impression was wrong. The BC110L is truly an affordable, high-performance charger. Although it lists for \$110, it can be found in hobby shops for \$70 to \$85 (prices will vary with location).

My final impression? The Tekin BC110L is small in size, but it's very big in performance. This is a charger that everyone should check out. It's one very hot little unit.

**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*

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JUNE 21-23, 1996

The track is an awesome 1080 feet banked at 26 degrees

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ADDRESS _____, _____, _____

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For more information please call Paul West after 6 PM (317) 888-5705

HOW TO

MOST QUESTIONS asked at an average R/C gathering are pretty easy to answer. Which tires should I use? What's the best gear ratio for an 11-turn motor on this track? Which pistons and oil should I use in my shocks? Most of the questions are about setting up a specific vehicle for certain track conditions, and novices want to know the best way to charge batteries and dial in their speed controls.



As you can see here, there are several available power supplies. Which is best for you will depend on your budget and on the services available at your local track.

Pick a Power Supply

by Rick Schwartz

But the questions that are asked most often and usually produce a sheepish shrug of the shoulders are: "Where do I plug in? Where do I hook up my AC/DC charger or my power supply?" Unfortunately, most tracks are not equipped with AC plugs for the unprepared racer. Remember, most Ni-Cd battery chargers require DC (direct current) power, so you'll need either a power

supply that can convert AC to DC, or a straight DC source.

Fortunately, there are many options. It doesn't matter whether you are a hardcore, active racer or an interested participant who races occasionally. The main thing is to determine your needs and what you can afford, and proceed from that point. Don't underestimate your power requirements though. If you plan to compete for a while, think of what you'll need in the more distant future, not just next week.

- **Full-size car battery.** This is the most obvious source of power for charging. It's DC, too, so you can just hook your charger's input leads to the battery's terminals (observing proper polarity, of course). If you drive to the track, this is easy to do: park in the shade (keeps things cool), lift the hood and charge away.

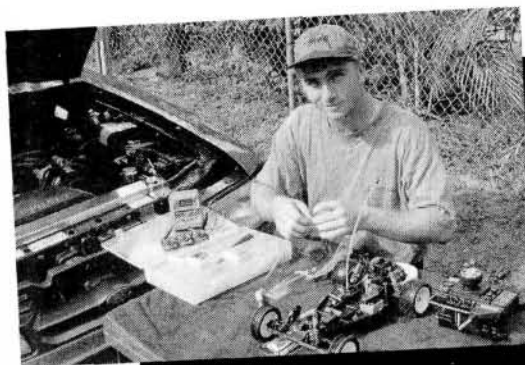
Because the charger drains power from the car battery, however, every few hours, you must disconnect the charger, start the car, and let it idle for at least 10 minutes so the

Another economical power supply is a deep-cycle marine battery. These batteries may be repeatedly discharged completely and then recharged. The drawback is that they weigh a ton and are a little difficult to lug around.

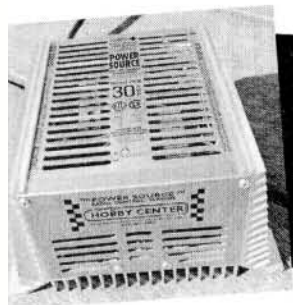


alternator can recharge the battery. Remember: safety first! Never charge with the car running. Before you start the car, always disconnect the charger and remove it from the engine. You don't want to risk catching a charger wire in the fan belt.

- **Deep-cycle marine battery.** This type of battery can be almost completely discharged, but because of its chemical composition, it will not be damaged and will accept a full charge the next time. These batteries are available at Sears, Firestone



By far the most practical power supply is your automobile battery. Just hook up the leads from your charger, and charge away! Doug Laurent uses his Novak® Digi-Peak to charge up a 1700mAh battery pack.



For serious racers, AC-powered power supplies are a must. They provide a constant flow of amps to your DC-powered battery charger as well as to tire truers and comm lathes.

your batteries.

The first option is a power supply that changes AC into DC, and there are several on the market. Some of the most popular are manufactured by Rivergate and

distributed by the larger hobby suppliers such as Horizon Hobby Distributors* and Great Planes Model Distributors*.

Power supplies are offered in different "strengths" depending on

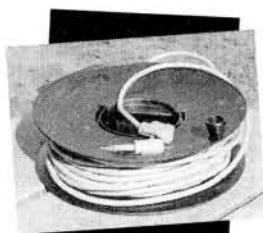
how much juice you need. A 16A unit will provide less power than a 75A unit, but if you're just charging batteries and not running a tire truer or a comm lathe, it will be adequate. The Rivergate Power Supply, which comes in 15A, 30A, 45A and 75A ratings, costs anywhere from \$160 to \$437. The racers I know who use this unit have the 30A model, which costs about \$222.



If you race out in the boonies and you can afford to spend \$300 or more on a power supply, a gas-powered generator is a hot setup. Not only will it power your battery charger, but it will also power a computer, a CD player, a TV monitor and half of Manhattan!

• **A generator.** Although you have to charge your Ni-Cds off a DC source, many racers need AC to energize their power supplies or AC/DC chargers (more about these later). If AC power is not readily available, the next best thing is a gas generator. These babies will provide more than enough juice for any racer's needs, unless they run a refrigerator and an air conditioner! No matter where you go, generators will give you power.

There are, however, certain problems with them. First, they're fairly expensive; even the smallest one will set you back several hundred dollars.



When you're miles away from an AC plug, you'll find that a heavy-duty extension cord is handy.

In addition, they run on gas and can therefore run out of gas at the most inopportune times. Most will run for several hours, but you have to check on them occasionally to make sure they

haven't quit. Fortunately, most are loud enough to let everyone in a 100-mile radius know when they're running.

• **Use an AC source.** If you do have AC power or a generator at the track, you can convert it into the DC you need to charge

A second option is the AC/DC charger, which allows you to charge your batteries from an AC or DC source. If you decide to buy one, make sure that it has the

capacity to provide a constant charge when charging from AC. The transformers in some chargers aren't powerful enough, so they get hot, and although the charger's meter may read that it's charging at 5 or 6 amps, it may actually be charging only at 3.5 amps.

An AC/DC-powered battery charger is very convenient.

You can plug it into a wall socket or into a power supply. Many models are available, from your basic 15-minute quick-charger to high-zoot peak chargers such as this Tekin* BC 112C.



POWER PAK



The portable Power Pak from Rusty's R/C Products* is a rechargeable 12V power supply that has a 17Ah, maintenance-free, built-in battery that can be charged the night before a race then used to power your charger at the track (just like an auto battery or a deep-cycle marine battery).

If you have AC power at the track, you can plug in the Pak, and it will trickle-charge your battery continuously. If necessary, you can plug The Pak into your car cigarette lighter, and for you gas guys, it has an optional charging pack for your glow-plug igniter. A voltmeter and a test button allow you to find out exactly how much power is left, and—best of all—it's a lot lighter than a marine battery. The price?—around \$160.

PICK ONE, ANY ONE

The final decision on which power source is best rests with you, the driver. You know the situations you face at your track and should gear your purchase

accordingly. If you plan to travel far to race, call ahead to see which power sources are available at the track. Buy what you need to meet your future needs as well as your present ones. If you

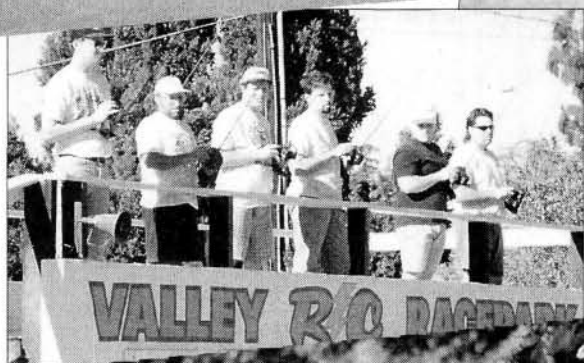
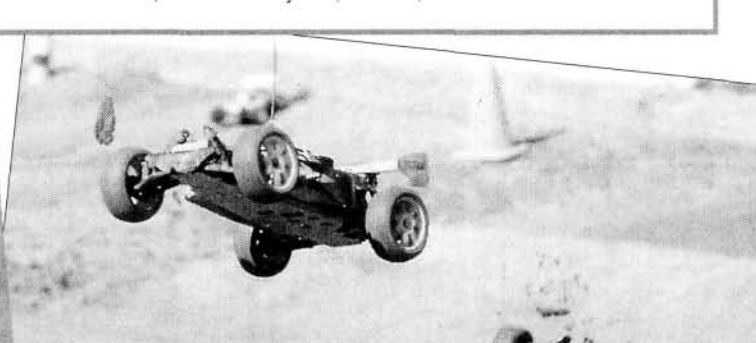
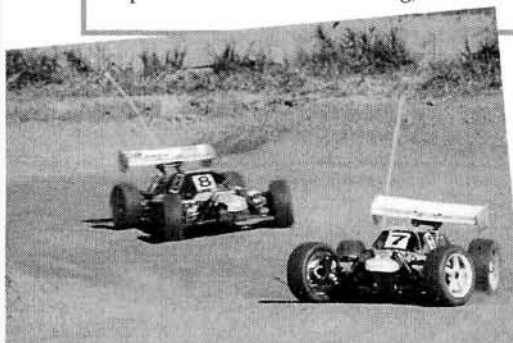
make the right choice of equipment, it will pay for itself many times over.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.



Holiday Spirit in Hemet

Every holiday season, Valley R/C Park in Hemet, CA, holds a race for charity. Most recently, the beneficiary was "Toys for Tots." How did it work?

Instead of paying the regular entry fee, all of the racers had to take along a toy costing around \$10. In addition to the track regulars, factory drivers such as Jack Johnson, Jon Anderson, Ron Rossetti, Kris Moore, Mark Pavidis, Mike and Steve Dunn, also joined in the action. Qualifiers and Mains were run for both 1/8-scale buggy and truck classes.

Counterclockwise from the top: these 1/8-scale gas buggies burn up the track; drivers await the start of their heat; the pit group launches the cars at the starting line; the buggies scream toward the finish; Jack Johnson wrenches on his car, hoping to find a winning setup.

call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series
(404) 963-0252

Tamiya R/C Championship Series
(800) TAMIYA-A

Kyosho R/C Sport Racing
(800) 682-8948 ext. 085F

Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity's Street Spec Series
(908) 862-1705

Dog Days of Racing



R/C Car Action contributing author Wendy Matsuda is trying to set up a parking-lot racing club in Oakland, CA, but so far, things have been off to a slow start. At the makeshift track, Wendy and a handful of racers spent a good part of the day competing against a stray dog that thought they could use a little attendance boost.

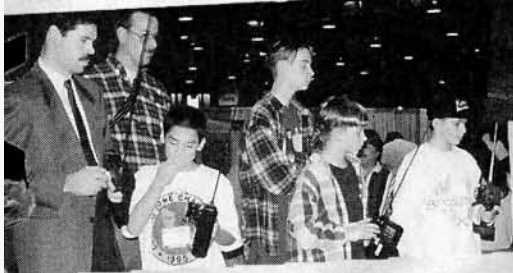


R/C racing has been in the Hawes family for three generations. At 90 years old, Frank (middle) still builds BoLink

GENERATIONS

Legends for his son Don (right) and his grandson Derek (left) as well as for any other racer who may ask. They race at Ace Hobbies in South Daytona, FL.

Street Spec Racing Around the Country



Street Spec goes West

Here are some of the dates and sites of the Trinity "Spec-10" 1996 California R/C Series Championship races

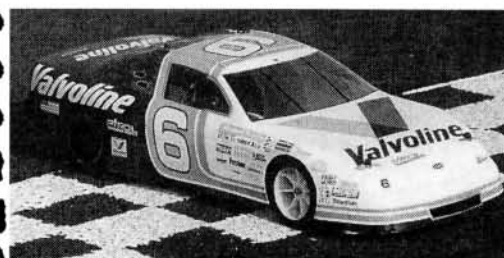


Clockwise from left: Team Trinity members set up a track at the 1995 National Model and Hobby show in Chicago, IL, where hundreds of spectators got the chance to race a Trinity Spec car. Charlie Suangko Sr., Charlie Suangko Jr., Mike Nelson, Mike Steineke and Dan Dettlaf (not shown) kept the races running smoothly. The Street Spec series is also popular at Scooter's Hobby Hut in Niles, OH. Here, Scooter presents Phil Jones with his new Trinity Hauler bag for setting a new spec-car track record. The A-Main winners bask in the glory of victory.

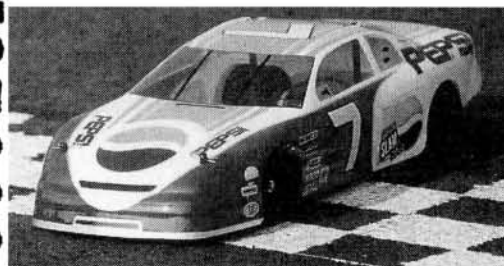
DATE	TRACK
April 28	RC Sports, Vacaville, CA (roadcourse)
May 26	Hawk's R/C Raceway, Antioch, CA (oval course)
June 23	Joel Johnson's Place, San Jose, CA (roadcourse)
July 28	RC Sports, Vacaville, CA (roadcourse)
August 18	Hawk's R/C Raceway, Antioch, CA (oval course)
September 15	Joel Johnson's Place, San Jose, CA (roadcourse)
October 20	RC Sports, Vacaville, CA (roadcourse)
November 24	Hawk's R/C Raceway, Antioch, CA (oval course)
December 15	Joel Johnson's Place, San Jose, CA (roadcourse)



Texan Stockers



Rick Stubblefield and his sons Richard and Bernie run these good-looking stock pan cars weekly at the North Houston Speedway in Texas. The club runs a stock class that requires foam tires and, of course, stock motors.



TECH HEAD

by Frank Masi

Shock-piston swapping

RECENTLY, while perusing the Internet news group rec.model.rc.land—a group dedicated to the discussion of R/C cars and related topics—I came across this interesting posting by Ron Zeppin

(rzeppin@inf.net): "How do Losi and Associated pistons cross over to each other? For example, what color Losi piston is equal to a no. 1 Associated piston?"

I first rationalized the need for knowing this information. Because of differences in manufacturing techniques and tolerances (the acceptable "margin of error" during manufacturing), I doubt that it's too wise to use Associated pistons in Losi shocks (or vice versa), but some people might wish to experiment despite these potential fit problems.

To compare pistons from two different manufacturers, you have to take into consideration not only the size of each piston's holes, but also the diameters of the pistons themselves. In a nutshell, you'll need to know

the total surface area of each piston.

PISTON COMPARISON

• **Diameter.** During a few phone calls, I learned that Losi pistons range from 0.4005 to 0.4015 inch in diameter, and Associated diameters range from 0.3975 to 0.3980 inch. To simplify things, let's say that the average Losi piston has a 0.401-inch diameter and the average Associated piston measures 0.3978 inch—a difference of 0.003 inch.

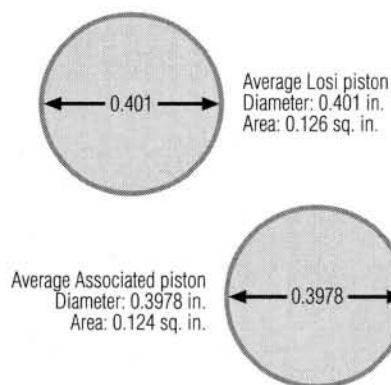
• **Area of piston disk.** To compare pistons, we first must determine the area of the piston disk itself. Using the formula for determining the area of a circle— πr^2 (pi [3.14] multiplied by radius squared), we know that the area of the average Losi piston is 0.126 square inch ($3.14 \times 0.20052 = 3.14 \times 0.04 = 0.126$), and an average Associated piston is 0.124 square inch. Subtracting the difference, the Associated piston disk has 0.002 square inch less surface area than the Losi disk.

• **Total area of pistons' holes.** The next step is to determine the total area of each piston's holes. To do this, you need to know just how large each hole is. Associated no. 1 pistons have two 0.056-inch-diameter holes. Finding the area of each hole (again, using the formula for the area of a circle— πr^2), we get 0.0025 square inch for each hole. Multiply this by 2 (there are two holes in the piston), and we get a total valving area (TVA) of 0.0049 square inch.

The last step is to subtract the area of the piston's holes from the area of the piston disk itself ($0.124 \text{ square inch minus } 0.0049 \text{ square inch} = 0.1191 \text{ square inch total piston surface area [TPSA]}$).

MATCHING PISTONS

Our goal is to find a Losi piston that most closely approximates the damping characteristics of an Associated no. 1 piston, and the best way to do this is by comparing TPSAs. There are two ways to do this. The first



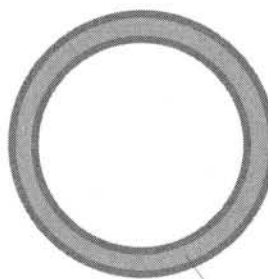
Area of a circle = πr^2 $\pi = 3.14$ (approx.)
 r = radius of the circle = $\frac{1}{2}$ diameter

Figure 1. Finding the area of the piston disks.

Drill-Bit Diameters

Most drill bits used for machining are designated by numbers, not by the size of the bit. This chart matches drill bit number with bit diameter in inches. Only the bits that are the same size as popular shock piston-hole diameters are listed.

Bit no.	Size (in.)
50	0.070
51	0.067
52	0.0635
53	0.0595
54	0.055
55	0.052
56	0.0465
57	0.043
58	0.042
59	0.041
60	0.040



The differing areas of the average Losi shock piston disk and the average Associated piston disk affects shock damping. The smaller Associated piston allows more oil to pass between its edge and the inside of the shock body.

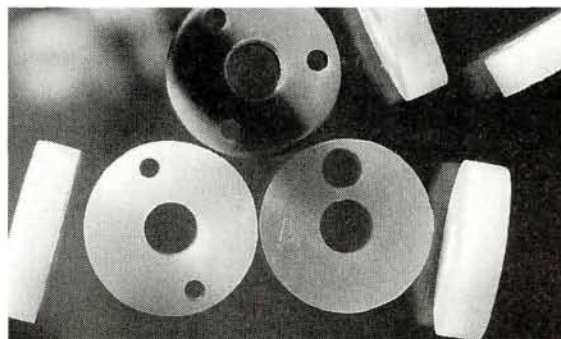
The shaded area indicates the difference in area between Losi and Associated shock piston disks: 0.002 sq. in. ($0.126 \text{ sq. in. minus } 0.124 \text{ sq. in.}$). Note: illustration is not to scale.

Figure 2. Finding the difference between piston disk areas.

is to figure the TPSA of each available size of Losi pistons. But because we know three important things about the Associated no. 1 piston (its TPSA, its TVA and its disk surface area), it's easier to work "backward" to find the suitable Losi piston.

We know that the disk area of Losi pistons is 0.002 square inch larger than that of the Associated pistons. This area must be added to the TVA of the Associated piston (0.0049 square inch) because it affects the surface area of the piston and, therefore, how much oil can flow through and around the piston. Adding these (0.002 square inch + 0.0049 square inch), we get a TVA for our prospective Losi piston of 0.0069 square inch.

Next, we must determine what hole diameter in a Losi piston will provide a TVA of 0.0069 square inch. Because Losi



pistons have three holes, divide the desired TVA by 3 (0.0069 square inch ÷ 3 = 0.0023 square inch). Now, we know that each hole in the Losi piston must have an area of

Then, find the square root of this quotient (the number resulting from the division) to find the radius, which is 0.027 inch. Multiply the radius by 2 to find the diameter

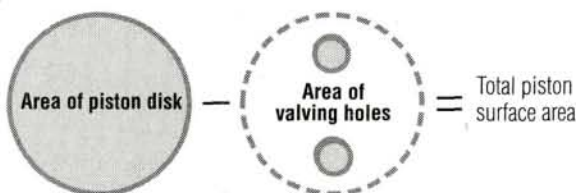


Figure 3. Finding the total piston surface area.

0.0023 square inch. Work the equation πr^2 backward to get the diameter of each hole by first dividing the area of the hole (0.0023 square inch) by π (3.14), which comes to 0.00073 square inch.

of each hole (0.027 inch x 2 = 0.054 inch).

There! that wasn't so bad was it? To sum up all this work: to find a Losi piston that has the same TPSA as an Associated no. 1 piston, you'll need one that has 0.054-inch-diameter holes. Losi blue pistons are drilled with a no. 54 bit (0.055 inch diameter) and the orange pistons with a no. 55 bit (0.052 inch diameter). So if you're looking for a Losi piston that approximates the damping of Associated's no. 1 piston, either one of these will do. Also, remember that by using the above equations and methods, you can compare any size and type of piston to find a match. ■

Team Losi/Associated Piston Sizes

Because this particular column discusses Team Losi and Team Associated shock pistons, here are details of their currently available pistons and the sizes of the valving holes.

Team Losi—3 holes

Piston	Hole size (in. dia.)	Piston dia. (in.)
Blue 54	0.055	0.4005 to 0.4015
Orange 55	0.052	0.4005 to 0.4015
Red 56	0.0465	0.4005 to 0.4015
Natural 60	0.040	0.4005 to 0.4015

Team Associated—2 holes

Piston	Hole size (in. dia.)	Piston dia. (in.)
No. 1	0.056	0.3975 to 0.3980
No. 2	0.052	0.3975 to 0.3980
No. 3	0.048	0.3975 to 0.3980

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Wake Up Guys And Smell The "A" Main; Remember, B&T Does Not Race or Sponsor. If We've Got It You Can Buy It; We Do Not Save The Best Cells For Ourselves.

SANYO 1400 SCR CELLS	
IND. CELLS	\$ 3.00 EA.
6 CELL 275+	\$23.00 EA.
6 CELL 285+	\$28.00 EA.
6 CELL 294+	\$38.00 EA.
6 CELL 300+	\$52.00 EA.
4 & 7 CELL ALSO AVAILABLE	
SANYO 1700 SCRC CELLS	
IND. SP CELLS	\$ 4.50 EA.
6 CELL 340+	\$32.00 EA.
6 CELL 350+	\$38.00 EA.
6 CELL 360+	\$48.00 EA.
6 CELL 370+	\$65.00 EA.
4 & 7 CELL ALSO AVAILABLE	
SANYO RECHARGEABLE "AA"	
SANYO N600 SCR CELLS	\$3.50 EA.
SANYO N1000 SCR CELLS	\$3.50 EA.
SANYO N800 AR CELLS	\$3.50 EA.
4 CELL RECEIVER PK.	\$10.00 EA.
5 CELL RECEIVER PK.	\$18.00 EA.
EDGE COMM STICKS	
COOPER TIRES & WHEELS	

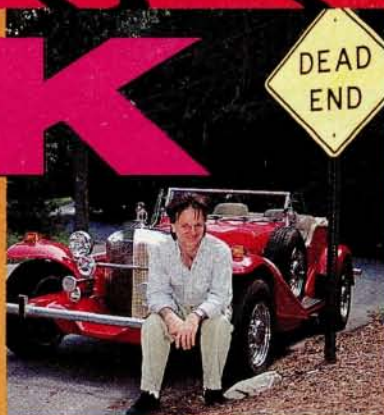
STOCK MOTORS	
MATRIX 24" 36"	
CAM MOTORS 24" 36"	
RACE PREP 24"	
TRINITY 24" 36"	
POINT BLANK 24"	
EXTREME MOTORS 24" 36"	
FANTOM HAND WOUND	
BUSHING MODIFIEDS	
9 SGL. THRU 18 DBLE.	
MOTOR BRUSHES	
Extreme HC-80	
RACE PREP R, P & H - CUT	
TRINITY SILVER	
BUD HOLLOW	
NEW CAM #5812S & #6220L	
McLIN FIDDLE STICK	
PRO-FIT AXLES	
PROFIT CAN OPENER	
HIGH GRADE STAINLESS	
STEEL WHEEL BEARINGS	
WOLFEMOTORS/SPORTS	
SPRINGS & ACCESSORIES	

S & K PRODUCTS	
BATTERY CLAW	
MOTOR STATION	
HOOD ALIGNMENT TOOL	
BRUSH CUTTER	
PINION PAL	
B & T PRODUCTS	
BATTERY DISCHARGE TRAY	
BRUSH SPRINGS	
B & T COPPER BARS	
BATTERY BRAID	
14 GAUGE WIRE	
SHRINK "3" COLORS	
BATTERY TAPE	
BUDS DIFF BALLS	
EXCELL MOTOR SPRAY	
SCAT PRODUCTS "OIL"	
IRRGANG RACING PRODUCTS	
ULTIMATE DIFF ASSEMBLY	
DU-MOR SPUR & PINIONS	
RACE PREP POWERZONE	
EXTREME JOHNNY JUICE	

WRITE/CALL FOR FREE CATALOG-DEALER CALLS WELCOME-MASTERCARD/VISA ACCEPTED

CHRIS'

BACK LOT



This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chrisc@airage.com



RALLY TIME

It's rally time for something new

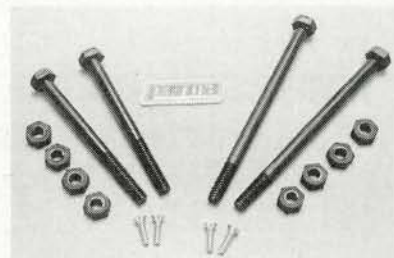
Wile E. Coyote isn't the only one claiming the title of "super genius." As immodest as this sounds, I originated the idea of mounting rally-car bodies on 1/10-scale, 2WD off-road buggies.

Now everyone, including my "friends" here at the magazine, is standing in line to take credit for my insight. Before you start writing letters to the contrary, keep this in mind: I know that Tamiya and Kyosho have been making rally cars for years and that Schumacher sells full-body versions of its 4WD off-road buggies. But the idea of turning RC10s and JRX2s and Kyosho Ultimas into rally monsters is, like this page, mine. Do you hear? MINE!

So far, I've only sketched broad strokes, but it's time to give you the full picture. The entire reason for rally cars is to give that old, dusty buggy that has been under your bed for two years a new lease on life. By the time we've finished our rally "makeover" (much more effective than those cheesy makeovers they do on Ricki Lake—"Ooooh, doesn't she look gorgeous?"), you'll think that you've just plunked down major moolah for a new car!

So far, I've driven my rally test mule over almost every conceivable terrain, and I'm happy to report that it hasn't got stuck yet! With enough body clearance (rally cars sit a little taller than street cars anyway), it will make most jumps at an off-road track without digging in too badly. Don't wait for someone else to do the work for you by making a kit! Follow me and make your own. You and I will start the rally trend!

**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*



My first rally car is just shy of completion, so I can't show you any photos of it yet; but, here's what I used to make the conversion:

- Parma's* Toyota Celica Rally body (part no. 10374) and Universal Body Mount set (10450);
- Pro-Line* Rally Hawg tires—8061 (rear), 8155 (front);
- A few decals from Tamiya's* Castrol Celica body parts set. (Though they're a little small, they help make the car look like the Celica in "Sega Rally.")